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Hirsch

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"A"

[54] **METHOD OF ALTERING PERCEPTION OF RELATIVE SPACE OF AN AREA**

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[51] **Int. Cl.**[6] **A61K 7/00**; A61K 7/46

[52] **U.S. Cl.** **424/47**; 514/957

[58] **Field of Search** 514/957; 424/47

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,671,959	6/1987	Warren et al.	424/195.1
5,382,567	1/1995	Fuwa et al.	512/4

OTHER PUBLICATIONS

Buchbauer, G., *Z. Naturforsch Sect C Biosci.*, 46(11–12):107–1072, 1991.

Komori, T., *Neuroimmunomodulation*, 2(3):174–180, 1995.

J. Borden, "This story stinks, but it might be quite lucrative," *Chicago Business Crain's*, Metro Chicago's Business Authority (Dec. 2–8, 1991).

Hirsch et al., Amer. Psych. Assn., 1995 Annual Meeting (Miami, Florida), Abstract NR398 ("Odors and Perceptions of Room Size")(May 20–25, 1995).

Ludvigson & Rottman, *Chemical Senses* 14:525–536 (1989).

Erlichman, H. and Bastone, L., "Olfaction and Emotion", *Science of Olfaction*, pp. 410–417, Serby and Choboro (Eds.), Springer–Verlag, New York, NY (1992).

Erlichman, H. and Bastone, L., *Perfumer & Flavorist* 16:11–12 (1991).

P.D. MacLean, "Cerebral evolution of emotion," in Lewis and Haviland (eds.), *Handbook of Emotions*, p. 77, The Guilford Press, New York, NY (1993).

H. Sugano, *JASTS* 12–8 (Abstract) (1988).

A.R. Hirsch, *Advances in Consumer Research* 19:390–395 (1992).

J.R. King, "Anxiety Reduction Using Fragrances," *in Perfumery, The Psychology and Biology of Fragrance*, pp. 147–165, Van Toller & Dodd (eds.), Chapman and Hall, Ltd., London (1988).

Hirsch et al., *Chemical Senses* 17:643 (1992) (AChemS XIV Abstracts 124–128).

Amoore et al., *Rhinology* 21:49–54 (1983).

Doty et al., *Chemical Senses* 10:297–300 (1985).

W.W.K. Zung, *Arch. Gen. Psychiatry* 12:63–70 (1965).

W.W.K. Zung, *Psychosomatics* 12(6):371–379 (1971).

C.B. Scrignar, "Stress Strategies," in *The Treatment of Anxiety Disorders*, pp. 6–8, Andrews et al. (eds.), Cambridge Univ. Press, New York, NY (1994).

Clarke et al., *Hypnosis and Behavior Therapy, The Treatment of Anxiety and Phobias*, pp. 320–321, Clark and Jackson (eds.), Springer Publishing Company, New York, NY (1983).

World Psychiatric Association, *Panic Anxiety and its Treatments*, p. 7, Klerman et al. (eds.), American Psychiatric Press, Inc., Washington, D.C. (1993).

Rachman and Taylor, J. Anxiety Disorders, 7:281–291 (1993).

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[57] **ABSTRACT**

The present invention provides a method for altering a person's perception of a confined or open space by administering an odorant substance to the person.

18 Claims, No Drawings

METHOD OF ALTERING PERCEPTION OF RELATIVE SPACE OF AN AREA

BACKGROUND OF THE INVENTION

Individual tolerance of spatial size varies from the extremes of claustrophobia (the fear of closed or narrow spaces) to agoraphobia (the fear of open spaces). The everyday lives of persons with spatial anxiety can be dramatically affected. Those with severe claustrophobia fear everyday activities such as riding in elevators, buses, and subways. Those with agoraphobia may have difficulty leaving their homes. Claustrophobia, based on community samples, ranges from about 10 to 11.3%. The calculated lifetime prevalence of agoraphobia is between about 0.5% and 1.7%. A person with claustrophobia or agoraphobia experiences panic attacks when in a small, confined area or in an open space, respectively. The panic attack can result in a physiological response including an increased heart rate, sweaty palms, trembling and shortness of breath.

Entire courses in interior design and architecture have focused upon influencing perceptions of surrounding space, and countless resources are spent to expand cramped offices and shrink vast convention halls. Visually, a cramped room can be enlarged, for example, through the use of mirrors, windows and/or natural light, and by positioning furniture along the periphery. The visual image can also be used to lessen the expanse of a large room, for example, by using curtains, dim lights and/or ornate designs, and by placing furniture in the middle of the room.

Auditory stimuli, such as echoes, can also affect judgment of room size. Bare walls that increase echoes can make a room seem larger. In contrast, carpets and padded walls can dampen sound and make the room seem smaller.

The sensation of touch can also influence perceived room size. Hardwood floors can enlarge a small interior while plush carpeting and oversized furniture can decrease the expanse of larger interiors.

Perceptions of room size can also be influenced by temperature. A warm fireplace can impart a cozy feeling in a large living room. An extreme temperature, such as a frigid parking garage in winter, can increase feelings of solitude and emptiness. In contrast, an oppressive summer heat can induce a feeling of confinement, particularly when stalled in a traffic jam.

Although such design changes can alter a person's perception of room size to lessen the feelings of claustrophobia and agoraphobia, persons suffering from such ailments cannot rely on such alterations in every instance. Therefore, an object of the invention is to provide a means to enable a person suffering from a spatial tolerance disorder to better tolerate a closed/narrow space or open space. Another object of the invention is to provide such means in a form that is portable and can be carried by the individual for ready access and use.

SUMMARY OF THE INVENTION

The present invention provides a method for treating a patient having a spatial dissonance by administering an odorant substance that will alter the patient's perception of relative space of an area. An odorant substance can be administered to expand a person's perception of a cramped and/or confined space or to diminish his or her perception of a wide or vast space.

According to the invention, a substance having the characteristics of a green apple odorant, cucumber odorant, or seashore odorant is administered to a patient to cause the patient's perception of a confined area to become altered and expanded, preferably using a green apple odorant. The invention further includes administering a substance having the characteristics of a barbecue smoke odorant to a patient to cause the patient's perception of an open area to become altered and diminished.

The introduction of a space perception altering odorant can be used to decrease the anxiety felt by claustrophobic and agoraphobic persons and thereby help them to more easily assimilate into an everyday environment. The introduction of a space perception altering odorant can also be used to comfort persons who do not have the extreme anxiety characteristic of claustrophobia or agoraphobia, but experience a mild spatial dissonance, by modifying the ambience of everyday surroundings and changing their perception of relative space.

DETAILED DESCRIPTION OF THE INVENTION

According to the invention, it was found that the administration of a green apple odorant substance will expand the perception of room size for a person suffering from claustrophobia. In particular, it was found that a green apple odorant can decrease the anxiety in a person suffering from claustrophobia, or other like phobia, and/or reduce the stress experienced by a person with mild spatial dissonance of closed or narrow space. Examples of such confined spaces include an enclosed room, closet, telephone booth, elevator car, train compartment, airplane compartment, automobile interior, subway compartment, and the like. While not as dramatic of an impact as green apple, seashore and cucumber odorant substances can also be used to increase or expand the perception of room size.

It was further found that administration of a barbecue smoke odorant substance will diminish perception of room size or space of an area, for a person suffering from agoraphobia or other like phobia. A barbecue smoke odorant can therefore be used to reduce the anxiety felt by a person suffering from agoraphobia, and/or reduce the stress experienced by a person with a mild spatial dissonance of open space such as a convention hall, interior of a mall, hallway, concert hall, out-of-doors expanse, and the like.

Such odorants are commercially available, for example, from International Flavors and Fragrances, Inc. (IFF), New York, N.Y.

According to the invention, the odorant substance is dispensed in an amount and time effective to provide a vaporous emission for inhalation by the patient to effectively change the patient's perception of space and reduce anxiety of the patient having a stress reaction due to a spatial dissonance. Such an effect can be assessed and measured subjectively by interviewing and questioning the patient about their perception of relative space before and after the administration of the odorant substance, and assessing their response according to an analog rating scale, for example, a scale of 1–5 wherein 1=confined and 5=roomy.

The odorant can be dispensed by means of a scented cloth such as a fragranced surgical mask, a vessel containing the odorant substance, optionally with a valve and nozzle mechanism for dispensing the substance, a blister pack containing a preparation of the odorant, an aerosol or non-aerosol spray, a gas, a solid or liquid air freshener, a scented cloth, lotion, cream, perfume, cologne, potpourri, incense, lightbulb ring, a candle, fabric softener, carpet shampoo or freshener, a plug-in air freshener, scratch-and-

sniff odor patches containing microcapsules of the odorant, and the like. The odorant substance can be administered in combination with an odorless liquid carrier such as mineral oil or water, and can be formulated with a viscosity effective to allow for aerosolization.

The odorant can be provided in a portable dispenser for ready individual use, for example, by means of a blister pack, a small vial of lotion, a booklet of scratch-and-sniff odor patches, and the like, that include an effective amount of the desired odorant substance. An odorant substance can also be administered to a group of people within a confined area, for example, by pumping air containing the odorant substance through an air vent, spraying the odorant substance into the air as a mist or dry powder using an aerosol or non-aerosol spray, or by placing the odorant substance as a solid or liquid in the room such as a solid or liquid air freshener, scented candle, carpet freshener, and the like.

The odorant substance can be packaged as a part of an article of manufacture, or kit. The kit can include in association, for example, (a) the odorant substance, carrier and other optional additives for forming a composition, placed in containing means such as a vial, jar, pouch, can, bottle, cloth, aerosol can, blister pack, and the like, containing an effective amount of the odorant substance; and (b) means for instructing as to the odorant substance and its use for treating a spatial dissonance to alter a perception of room size. The parts of the kit can be contained or separately packaged within a packaging material, such as a box or bag.

EXAMPLE

Subject evaluation.

Eight subjects, four females and four males, aged 18 to 64 years (mean =30.9, median 19), underwent a series of olfactory and psychological tests. Formal olfactory tests included Pyridine Threshold Test of Amoore, Unilateral Thiophane Threshold Test of Amoore, and the University of Pennsylvania Smell Identification Test (Hirsch et al., *Chemical Senses* 17: 643 (1992); Amoore et al., *Rhinology* 21:49–54 (1983); and Doty et al., *Chemical Senses* 10:297–300 (1985), respectively). All were performed according to standard test procedures.

Olfactory test results were as follows: on the threshold test of Amoore, five subjects scored 100%, two scored 90%, and one scored 80%. UPSIT scores ranged from 19 to 37. Subject number 2 scored hyposmic (diminished sense of smell) on this test as adjusted for age and sex. The seven remaining subjects had UPSIT scores ranging from 29 to 37 (TABLE 1). Olfactory threshold ranged from –5 to 20 decismels with an average for the left nostril of 11.9 and for the right nostril of 10 decismels, all within the normal range (TABLE 1).

TABLE 1

OLFACTORY TEST SCORES

Subject	1	2	3	4	5	6	7	8
Threshold Tests of Amoore								
Score	90%	100%	100%	100%	100%	90%	80%	100%
UPSIT								
Score	36	19*	29	35	36	37	37	34
Olfactory Threshold								
Right	–5	15	20	10	10	5	15	10
Left	15	10	10	10	15	5	20	10

*Hyposmic

The following standardized self evaluations were also administered: Zung Self-Rating Depression Scale, Zung Anxiety Inventory, and Beck Depression Inventory (W. W. K. Zung, *Arch. Gen. Psychiatry* 12:63–70 (1965); W. W. K. Zung, *Psychosomatics* 12(6):371–379 (1971); Beck et al., "Assessment of Depression, Depression Inventory: Psychological Measurements in Psychopharmacology," in *Modern Problems in Psychopharmacology* (9th ed.), Pinchot et al. (ed.) (1974), respectively). Claustrophobia, phobia, and spatial anxiety were assessed using detailed self-evaluation questionnaires devised from a checklist integrating criteria specified by DSM-IV for diagnoses of panic disorder, anxiety disorders, and specific phobia (American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.), at pages 393–444, Washington, D.C., American Psychiatric Association (1994)). The subjects were also assessed according to standard questionnaires including Anxiety Status Inventory and the SCL-90R (Bystritsky et al., "Development of a Multidimensional Scale of Anxiety," *J. of Anxiety Disorders* (19___); L. R. Derogatis, The SCL-90R, Baltimore Clinical Psychometric Research (1977)). Also used was a compendium of several questionnaires based on claustrophobia (C. B. Scrignar, "Stress Strategies," *The Treatment of the Anxiety Disorders*, pages 6–7, S. Karger Basel (1983); Clarke et al., *Hypnosis and Behavior Therapy, The Treatment of Anxiety and Phobias*, pages 320–321, Springer Publishing Company, New York, N.Y. (1983); World Psychiatric Association, *Panic Anxiety and its Treatments*, page 7, Klerman et al. (eds.), American Psychiatric Press, Inc., Washington, D.C. (1993)). The questionnaire on claustrophobia also included a differentiation between "suffocating" and "restricting" claustrophobia (Rachman et al., "Analyses of Claustrophobia," *J. Anxiety Disorders*, pages 281–291, Pergamon Press Ltd. (1993)).

The psychological test scores showed that four subjects were at least somewhat anxious, of which one was depressed and another was slightly to moderately depressed (TABLE 2). Zung anxiety scores averaged 34.5 and ranged from 20 to 42 (less than 36 being normal). Zung depression scores averaged 34.4 and ranged from 24 to 46 (less than 40 being normal). Beck depression scores averaged 6.6 and ranged from 0 to 16 (14 or less being normal).

TABLE 2

PSYCHOLOGICAL TEST SCORES

	Subjects							
	1	2	3	4	5	6	7	8
*Zung Anxiety	39	20	42	37	32	42	33	31
**Zung Depression	35	24	43	32	33	46	34	25
***Beck Depression	11	0	10	6	4	16	4	2

*Normal = <36.
**Normal = <40.
***Normal = 14 or less.

Of the eight subjects, four were single. While one smoked cigarettes, none used drugs or medications.

In assessing individual variations in smell awareness, subjects were queried as to their perceptions of both their own personal odor and the odors around them, as well as their use of cosmetic and hygienic fragrances. One subject considered his sense of smell as excellent, while all others described their olfactory ability as normal. On a scale from 1–10, with 10 being the highest, subjects rated the importance of their sense of smell as 7 on average, with a range of 3–10.

In assessing perception of personal odor, five characterized the odor about them as pleasant, and three subjects considered their own smell as neutral or provided no response to the question. The general perception of a pleasant self odor correlated with personal fragrancing. Six of the eight subjects used commercial perfumes or colognes, and breath fresheners including mints and mouthwash, while two did not. In addition, while all eight subjects used a deodorant, the six subjects who used a perfume or cologne also used a scented deodorant. The two subjects who used no perfume, used an unscented deodorant.

The subjects were also questioned about external odors (those not from their natural body odor or personal fragrancing). Five subjects considered persons around them as having a pleasant smell, two were neutral about other people's odors and one subject perceived people around them as having an unpleasant smell. When questioned about the use of potpourri or room fresheners, four subjects were found to use such fresheners, three did not, and one gave no response.

Collection of Data

To assess initial perceptions of spatial size, the subjects completed a questionnaire including a 9-centimeter analog scale to rate the feeling of room size. This was performed twice, each time in a clinically odor-free environment: once in a 12 ft. by 9 ft. by 9 ft. examining room, and a second time in a cylindrical space-deprivation booth 2.5 ft. in diameter by 4.5 ft. in height. After sitting confined for one minute in the booth, subjects then donned unfragranced surgical masks. After 30 seconds wearing the masks, they again completed the analog scale. The masks were then removed for a two-minute odorless hiatus in the booth. The same procedure was repeated ten times using surgical masks with ten different fragrances applied.

The following fragrances were tested: evergreen (International Flavors and Fragrances, Inc. (IFF)); barbecue smoke (IFF 2247-HS); Tranquilities perfume (Elizabeth Arden); vanilla (Florasynth, Inc., New York, N.Y.; AE-3899); buttered popcorn (Florasynth; AG-6958 (GRAS)); seashore (IFF); charcoal-roasting meat combination (IFF 2189-HS); cucumber (IFF); coconut (IFF); and green apple (IFF).

One to two drops of each odorant were placed on each surgical mask, producing odor levels considered hedonically acceptable by a sensory panel consisting of staff from the Smell & Taste Treatment and Research Foundation. Although the odorant substance was administered using a fragranced surgical mask in the experiment, it is understood that a variety of shapes, sizes and configurations may be accommodated for the administration of the odorant substance according to the invention.

The perfumed masks were presented in a random, double-blind manner. Afterwards, subjects rated the familiarity of the odors and their hedonics (pleasant or unpleasant) on analog scales. Following testing of a fragrance mask, another unfragranced mask was applied for evaluation. Statistical analysis was then performed based on Signed-Rank test for pair differences (E. L. Lehmann, *Nonparametrics: Statistical Methods Based on Ranks*, Holden-Day (1975)).

Odors were classified two ways: "indoor" versus "outdoor" (TABLE 3), and as "food" versus "nonfood" (TABLE 4).

TABLE 3

CLASSIFICATIONS OF ODORS

Indoor	Outdoor
Barbecue Smoke	Evergreen
Vanilla	Tranquilities
Buttered Popcorn	Seashore
Charcoal Roasting Meat	Cucumber
	Coconut
	Green Apple

TABLE 4

CLASSIFICATIONS OF ODORS

Food	Non-Food
Barbecue Smoke	Evergreen
Vanilla	Tranquilities
Buttered Popcorn	Seashore
Charcoal Roasting Meat	Green Apple
Cucumber	
Coconut	

The effect of each odor on perception of room size was calculated for each of the eight subjects. This was done by first computing the average score on analog scales of room size for the two blank masks. This average score was then used as a baseline from which to determine the shift due to the presence of each of the odors (TABLE 5). This odor-induced shift was also calculated for the seven subjects defined as normosmics (having a normal sense of smell) based on the UPSIT and for the six subjects who were found to use personal fragrancing.

TABLE 5

EIGHT SUBJECTS' SHIFTS ON ANALOG SCALE OF ROOM SIZE WITH TEN ODORS

	Subjects							
Odors	1	2	3	4	5	6	7	8
Evergreen	−.25	0	−1	−2.5	2	.25	2.5	.5
Barbecue Smoke	−.25	0	−1	−.5	−1	−.25	−1	.5
Tranquilities	.25	0	0	−2	0	−.75	3	.5
Vanilla	.25	0	−1	−1.5	−1	−.75	3	0
Buttered Popcorn	−.25	0	0	−2.5	−.5	−.25	3.5	.5
Seashore	−.25	0	−.5	−2	.5	−.75	2.5	2
Charcoal Roasting Meat	−.25	0	.5	−1.5	−.5	−.75	2.5	.5
Cucumber	−.25	0	−1	−1.5	−1	.25	3	0
Coconut	−.25	0	−.5	2	−2	−.25	−3	.5
Green Apple	−.25	0	.5	−.5	1.5	.25	3	.5
	Subjects Characteristics							
Age								
Sex								
Good ability to smell	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Use perfume	No	No	Yes	Yes	Yes	Yes	Yes	Yes

For each subject, a change from baseline was detected for each odor. Additionally for each subject, the change from baseline of each odor was contrasted with the median change from baseline for the other nine odors tested. In this fashion, every odor was tested for each individual. Hence, for each individual, calculations were made for the difference between the analog shift for each odor and the mean of the analog shifts for the other nine odors.

The median change for each odor from calculated baselines for each subject was determined. The same method was

used to find the median for the other nine odors across all subjects. Then the significance of this difference was determined between these medians (TABLE 6). In a similar fashion, significance was determined for all normosmic subjects as determined by the UPSIT (n=7) (TABLE 7), and for those who used personal fragrancing (n=8) (TABLE 8).

TABLE 6

COMPARISONS OF MEDIANS OF ODOR SHIFTS FROM BASELINE VERSUS MEDIANS OF BASELINE SHIFTS FOR THE OTHER NINE ODORS ALL SUBJECTS (n = 8)
Each odor versus all others:

Odor	Signed-Rank Test p-value
Evergreen	.9844
Barbecue Smoke	.0469*
Tranquilities	.5469
Vanilla	.8438
Buttered Popcorn	.7427
Seashore	.5469
Charcoal Roasting Meat	.9453
Cucumber	.9453
Coconut	.7427
Green Apple	.1484

*Significantly lower than the average of all others

TABLE 7

COMPARISONS OF MEDIANS OF ODOR SHIFTS FROM BASELINE VERSUS MEDIANS OF BASELINE SHIFTS FOR THE OTHER NINE ODORS NORMOSMIC SUBJECTS AS DETERMINED BY UPSIT (n = 7)
Each odor versus all others:

Odor	Signed-Rank Test p-value
Evergreen	.9844
Barbecue Smoke	.0625*
Tranquilities	.1563
Vanilla	.8125
Buttered Popcorn	.2969
Seashore	.1563
Charcoal Roasting Meat	.4688
Cucumber	.6875
Coconut	1.0000
Green Apple	.0156**

*Lower, but no longer significantly lower than the others.
**Significantly higher than the average of all the others.

TABLE 8

COMPARISONS OF MEDIANS OF ODOR SHIFTS FROM BASELINE VERSUS MEDIANS OF BASELINE SHIFTS FOR THE OTHER NINE ODORS SUBJECTS WHO USE PERSONAL FRAGRANCE (n = 6)
Each odor versus all others:

Odor	Signed-Rank Test p-value
Evergreen	1.0000
Barbecue Smoke	.0938*
Tranquilities	.3125
Vanilla	1.0000
Buttered Popcorn	.4375
Seashore	.2188
Charcoal Roasting Meat	.5625
Cucumber	.8438
Coconut	.8438
Green Apple	.0313**

*Lower, but not significantly lower than the others.
**Significantly higher than the average of all the others.

Further, medians were also compared differentiating odors based on hedonics, recognition, and odor classification (i.e., indoor versus outdoor, food versus nonfood) for all subjects, normosmics and those using personal fragrancing, and p-values were computed in the same manner (TABLE 9).

TABLE 9

P-VALUES FROM THE SIGNED-RANK TEST FOR PAIRED DIFFERENCES

	All Subjects	Normosmics	Personal Fragrance Users
Like vs. Dislike	.3125	.3125	.4375
Recognize vs. Fail to Recognize	.1563	.1563	.1875
Indoor vs. Outdoor	.2031	.2031	.1563
Food vs. NonFood	.1563	.1563	.2188

Data Analysis

TABLE 5 shows the shift with each odor away from the average with the odorless masks. Those with positive values made the room appear larger and those with negative values made the room subjectively smaller compared to the non-odorized condition. The odor that caused a perceptual shift that was statistically significant was the odor of barbecue smoke ($p<0.05$) which decreased the perceived size of the room.

Data was further analyzed excluding the hyposmic individual, subject 2, (UPSIT rated microsmic) and also for the six subjects who used personal fragrances (subjects 3 through 8). In both these subgroups (normosmics and personal-fragrance users), the green apple odor increased perceptions of room size. In both groups, green apple odor produced statistically significant results: in all normosmics ($p=0.03$) and in normosmic fragrance users ($p=0.02$).

The green apple odor had the most significant impact of enlarging perception of room size. Seashore and cucumber had similar effects on perception although less significant than the effect provided by the green apple odorant.

The odors had no effect on the perception of room size by the individual with poor olfactory ability based on the UPSIT. This indicates that the odors did in fact cause response to room size perception.

Thus, the invention has been described with reference to various specific and preferred embodiments and techniques. However, it should be understood that many variations and modifications may be made while remaining within the spirit and scope of the invention, and the invention is not to be construed as limited to the specific embodiments shown in the drawings.

What is claimed is:

1. A method for altering a person's perception of relative space of a confined area, comprising:

administering to the person an effective amount of a green apple odorant such that the relative space of the area is perceived to diminish.

2. The method of claim 1, wherein the confined area is selected from the group consisting of a room, closet, telephone booth, elevator car, train compartment, airplane compartment, automobile interior, subway compartment.

3. The method of claim 1 further comprising questioning the person before and after administering the odorant to assess the effect of the odorant on the person's perception of the area.

4. The method of claim 1, wherein the method comprises administering the odorant in a form selected from the group

consisting of a spray, gas, scented cloth, lotion, cream, perfume, cologne, scratch-and-sniff odor patch containing microcapsules of the odorant, a blister pack containing the odorant, solid air freshener, potpourri, incense, lightbulb ring, candle, fabric softener, carpet freshener, and combinations thereof.

5. The method of claim 1, wherein the method comprises administering the odorant to a group of patients.

6. The method of claim 1, wherein the method comprises administering the odorant by pumping a gas containing the odorant through an air vent into a room.

7. The method of claim 1, wherein the method comprises administering the odorant by spraying the odorant substance into the air.

8. The method of claim 1, wherein the method comprises administering the odorant in combination with an odorless liquid carrier.

9. The method of claim 8, wherein the viscosity of the odorant in the carrier is effective to allow for aerosolization, and the method comprises administering the odorant by spraying the odorant substance.

10. A method for altering a person's perception of relative space of an area, comprising:

administering to the person an effective amount of a barbecue smoke odorant such that the relative space of the area is perceived to diminish.

11. The method of claim 10, wherein the area is selected from the group consisting of a convention hall, interior of a mall, hallway, concert hall, a roadway.

12. The method of claim 10, further comprising questioning the person before and after administering the barbecue smoke odorant to assess the effect of the odorant on the person's perception of the area.

13. The method of claim 10, wherein the method comprises administering the odorant in a form selected from the group consisting of a spray, gas, scented cloth, lotion, cream perfume, cologne, scratch-and-sniff odor patch containing microcapsules of the odorant, a blister pack containing the odorant, solid air freshener, potpourri, incense, lightbulb ring, candle, fabric softener, carpet freshener, and combinations thereof.

14. The method of claim 10, wherein the method comprises administering the odorant to a group of patients.

15. The method of claim 10, wherein the method comprises administering the odorant by pumping a gas containing the odorant through an air vent into a room.

16. The method of claim 10, wherein the method comprises administering the odorant by spraying the odorant substance into the air.

17. The method of claim 10, wherein the method comprises administering the odorant in combination with an odorless liquid carrier.

18. The method of claim 17, wherein the viscosity of the odorant in the carrier is effective to allow for aerosolization, and the method comprises administering the odorant by spraying the odorant substance.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO.: 5,759,521

DATED: June 2, 1998

INVENTOR(S): Alan R. Hirsch

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

At col. 8, claim 1, the phrase "such that the relative space of the area is perceived to diminish." should read as --such that the relative space of the area is perceived to expand.--

Signed and Sealed this

Fifteenth Day of June, 1999

Attest:

Q. TODD DICKINSON

Attesting Officer

Acting Commissioner of Patents and Trademarks

US005885614A

United States Patent [19]

Hirsch

[11] Patent Number: 5,885,614

[45] Date of Patent: Mar. 23, 1999

"B"

[54] USE OF ODORANTS TO TREAT MALE IMPOTENCE, AND ARTICLE OF MANUFACTURE THEREFOR

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[21] Appl. No.: **606,544**

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[58] **Field of Search** 424/451, 489, 424/58, 45, 46, 434

[56] **References Cited**

PUBLICATIONS

P.D. MacLean, "Cerebral evolution of emotion," in Lewis and Haviland (eds.), *Handbook of Emotions*, p. 77, The Guilford Press, New York, NY (1993).

H. Sugano, *JASTS* 12:8 (Abstract)(1988).

J. Borden, "This story stinks, but it might be quite lucrative," *Chicago Business Crain's*, Metro Chicago's Business Authority (Dec. 2–8, 1991).

A. R. Hirsch, *Advances in Consumer Research* 19: 390–395 (1992).

J. R. King, "Anxiety Reduction Using Fragrances," *in Perfumery, The Psychology and Biology of Fragrance*, pp. 147–165, Van Toller & Dodd (eds.), Chapman and Hall, Ltd., London (1988)).

Erlichman, H. and Bastone, L., "Olfaction and Emotion", *Science of Olfaction*, pp. 410–417, Serby and Choboro (Eds.), Springer–Verlag, New York, NY (1992).

Erlichman, H. and Bastone, L., *Perfumer & Flavorist* 16:11–12 (1991).

Ludvigson & Rottman, *Chemical Senses* 14:525–536 (1989).

Ehrlichman, H. and Bastone, L., *Perfumer & Flavorist* 16:11–12 (1991).

Baron, R.A., *Journal Applied Social Psychology* 20:368–384 (1990).

Hirsch, A. R. and L.H. Johnston, *Chemical Senses* 19: 46 (Abstr. No. 121)(1994).

Hirsch, A. R. and L.H. Johnston, *ACHEMS–XVI*: Abstract No. 142 (1994).

Hirsch, A. R. and L.H. Johnston, *Chemical Senses* 20(1): 77–78 (1995).

Amoore et al., *Rhinology* 21:49–54 (1983).

R. L. Doty et al., *Ann. Neurol.* 25: 166–171 (1989).

Doty et al., *Chemical Senses* 10:297–300 (1985).

R. Doty, *The Smell Identification Test: Administration Manual* 1983: 13–14, Philadelhia: Sensonics, Inc. (1983).

J.F. Gent, in *Clinical Measurement of Taste and Smell*, pp. 107–116, H.L. Meisolman (eds.), 602pp., MacMillan, Ny (1986).

Hirsch, A.R. and Cain D.R., *Chemical Senses* 17:642–643 (1992).

E. Koss et al., *Neurology* 38: 1228–1232 (1988).

A.R. Hirsch, *The Nose Knows*, Chicago Medicine, pp. 28–31, (Jul. 21, 1990).

A.R. Hirsch and J.J. Kim, *Phychosomatic Medicine*, 57:83 (1995).

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[57] **ABSTRACT**

A method is provided for inducing or enhancing penile erection through the delivery of odorants for inhalation. The administration of odorants provides an increase in blood flow to the penis, and a therapeutic aid to stimulate sexual activity and alleviate male vasculogenic impotence.

23 Claims, No Drawings

USE OF ODORANTS TO TREAT MALE IMPOTENCE, AND ARTICLE OF MANUFACTURE THEREFOR

BACKGROUND OF THE INVENTION

In men, the genital component of the excitement phase of the sexual response cycle is manifested by penile erection and scrotal elevation (Kolodny, Masters and Johnson, *Textbook of Sexual Medicine*, pages 507–508, Little, Brown and Company, Boston, Mass. (1979)). Erection is basically a cardiovascular event that is controlled by the nervous system. The first physical sign of sexual excitation is a change in penile blood flow. Blood flow increases to the penis with sexual excitement and is reduced with sexual inhibition.

Male erectile dysfunction, or impotence, is the inability to achieve or sustain an erection of sufficient rigidity to have sexual intercourse. The causes of impotence are psychological and/or organic (i.e., endocrinologic, neurogenic and vasculogenic). Ten to fifteen percent of male impotence is organic in nature. Organic causes can be from local lesions of the genitalia, endocrine diseases, organic lesions of the nervous system, and/or vasculogenic impotence from reduced blood flow is the most common organic cause usually seen in diabetes. Impotence may be a side effect of a therapeutic drug or associated with a disease such as multiple sclerosis, diabetes and sickle cell anemia, and can be exacerbated by smoking, inadequate diet among other factors. Emotional disturbances, including stress, fatigue or distraction, can also cause impotence.

In the sexual response, neuromuscular events simultaneously increase the amount of blood entering the organ and decrease the rate at which blood is allowed to leave it. Three vascular changes have been indicated in causing erection: shunting of blood into the cavernous spaces, contraction of muscular polsters on deep efferent veins, and vasoconstriction-induced reduction in superficial penile blood flow (G. Conti, *Octa. Anat.* 14:17 (1952)). As a function of the autonomic nervous system, penile engorgement is controlled by arterial flow through the pudendal artery and the smaller arteries to the penis. The increased arterial flow is accomplished by active dilatation of the arterioles. The process is reversed by the sudden constriction of the arterioles that accompanies ejaculation.

Alteration of blood flow to and from the penis is considered to be the most frequent organic cause of impotence. Vasculogenic impotence results from either arterial occlusion, i.e., the obstruction of adequate blood flow to the penile arteries, or excess venal outflow (cavernovenous leaking).

Treatment of impotence can include counseling directed toward dealing with the male's insecurities and feelings to reduce fears of sexual performance. Treatments for male impotence include surgery, penile prostheses implants including flexible rods and inflatable balloons, drugs such as vasodilators given to induce an erection as an ointment for topical application or a solution for transurethral injection, and external aids such as penile splints to support the penis or constricting rings to alter the blood flow through the penis. A drawback of those systems is their invasiveness, unwanted side effects, cost, inconvenience, and complexity.

Accordingly, an object of the invention is to provide a method of stimulating the male sexual response and inducing penile erection, that is non-invasive and easy to perform. Another object is to induce normal male sexual arousal.

SUMMARY OF THE INVENTION

These and other objects are achieved by the present invention which is directed to a method for stimulating the male sexual response through the delivery of an odorant substance for inhalation. The use of the odorants is particularly useful as adjuvants for inducing or enhancing an erection, and as aids for a non-invasive treatment of male vasculogenic impotence.

It was found that the administration of odorants for inhalation by a male individual having a normal olfactory ability effectively increased penile blood flow from about 2–40%, and enhanced sexual arousal. Preferred odorants are those that provided a 20–40% increase in blood flow to the penis, which includes lavender, oriental spice, cola and orange, and odorant mixtures of lavender and pumpkin pie, doughnut and black licorice, and pumpkin pie and doughnut. The odorants are useful as adjuvants to augment penile blood flow and as aids in the treatment of male impotence, and to enhance sexual arousal in normal males, i.e., those without sexual dysfunction.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a non-invasive method of increasing blood flow to the penis to augment penile erection, and of treating vasculogenic impotence through the use of odorants. The method is particularly useful for males who have a normal olfactory ability. Administration of the odorant to a male subject will increase penile blood flow such that in a normosmic person for which the odor is hedonically positive, the blood flow will increase by about 2–40% compared to blood flow without being given the odorant. Preferably, the odorant induces or enhances an erection sufficient for vaginal penetration.

Preferably, an odorant is administered that will increase penile blood flow by about 2–60%, preferably about 15–50%. Preferred odorants are those that increase blood flow by about 20–40%, which include, for example, lavender, oriental spice, cola and orange odorants, and odorant mixtures such as lavender and pumpkin pie, doughnut and black licorice, pumpkin pie and doughnut, and lavender and doughnut. Odorants useful in the present method are commercially available, for example, from International Flavors and Fragrances, Inc. (IFF), New York, N.Y.

The precise magnitude of a loss of smell may be determined by means of an odor threshold test. According to that test, an odorant substance such as butyl alcohol, phenyl ethyl alcohol or pyridine, is combined in an odorless liquid medium to provide a series of dilutions, or binary steps, of the odorant. For each successive binary step up the dilution scale, the odorant is present, for example, at one half the concentration of the preceding step. The highest concentration of the odorant usually provides the substance at an irritant level. The patient is presented with the series of dilutions in ascending order, and is asked to compare each dilution step to at least one control stimulus, such as odorless propylene glycol.

A "normosmic" individual is able to detect the odor of an odorant substance without irritant sensations when the substance is presented at a concentration within a range of the average normal threshold for the substance. A "hyposmic" individual is one who has a reduced capacity of the olfactory nerve being able to detect an odorant substance by its odor at a concentration, or decismel level, above that of a normosmic individual yet below its irritant concentration level. An "anosmic" individual is one who has essentially no olfactory nerve capacity being unable to detect the odor of the odorant substance, but has trigeminal nerve function, being able to detect an odorant substance by means of

irritant, tingling sensations when it is present at an irritant concentration. A patient who is able to detect pyridine vapor by means of irritant, tingling sensations caused by stimulation of the trigeminal nerve, but who cannot distinguish a pyridine odor at a lower concentration without such sensation, is considered to be anosmic having no olfactory nerve sensitivity. The term "microsmic" is synonymous with hyposmic.

The only limitation on the character of the odorant that is used is that it must be suprathreshold in intensity and not trigeminal in nature. According to the method of the invention, an odorant and/or odorant mixture is administered to a male subject/patient for sniffing and inhalation into the nasal passageway, to deliver an amount of the odorant effective to increase penile blood flow which is a suprathreshold level but not irritative in nature.

An odorant is presented at a suprathreshold level when the decismel level or concentration of the odorant is high enough to be detected by a normosmic individual. At its irritative level, the odorant level or concentration is so high that the odorant stimulates predominantly the trigeminal nerve rather than the olfactory nerve and, hence, is perceived as noxious. The irritation threshold of the patient is the lowest concentration of the substance that causes immediate stinging or burning sensations in the nose, or stinging or lacrimation of the eye. (See, J. F. Gent, in *Clinical Measurement of Taste and Smell*, pages 107–166, H. L. Meiselman et al. (eds), 602 pp., MacMillan, NY (1986); R. L. Doty et al., *Ann. Neurol.* 25: 166–171 (1989); E. Koss et al., *Neurology* 38: 1228–1232 (1988); R. Doty, *The Smell Identification Test: Administration Manual* 1983: 13–14, Philadelphia: Sensonics, Inc. (1983)).

The effect of the odorant and/or odorant mixture can be assessed objectively by administering a test to the subject to measure initial penile blood flow, and then re-testing the blood flow after being given the odorant. The effectiveness of the odorant on the subject can be observed by comparing the amount of penile blood flow before and after inhaling the odorant.

The use of the odorant or odorant/mixture is useful for increasing penile blood flow in a male individual who does or does not suffer from vasculogenic impotence to improve penile erection. Male vasculogenic impotence is the result of primary small vessel disease or is a secondary symptom of a disease such as diabetes, atherosclerosis or amyloidosis, for example.

The odorant can be delivered to the subject in the form of a liquid solution, aerosol spray, solid, microcapsules, or other suitable form to deliver an amount of the odorant for sniffing by the person to increase blood flow to the penis and effectuate and/or enhance penile erection and sexual arousal. A preferred amount of the odorant that is delivered is a suprathreshold but not irritative level.

The odorant substance can be administered in combination with an odorless liquid carrier such as mineral oil or water, and can be formulated with a viscosity effective to allow for aerosolization. The odorant can be dispensed, for example, by means of a cloth material that is coated with the odorant, as a solid or liquid form contained in a capped vessel, as a spray from an aerosol or pump-type spray device, as a nasal spray, by opening a blister pack or scratch-and-sniff odor patch containing the odorant in the form of microspheres, a vaporous emission from a pen-like dispenser containing a liquid form of the odorant adsorbed to a wicking material, a vapor from a solid or liquid air freshener, a lotion or cream, perfume or cologne, potpourri, incense, a lightbulb ring or candle, and the like. The odorant can be provided in a portable dispenser for ready individual and personal use, for example, by means of a pen-like delivery device, a blister pack, a small vial of lotion, a booklet of scratch-and-sniff odor patches, and the like, that include an effective amount of the desired odorant substance.

The odorant substance or odorant mixture can be packaged as a part of an article of manufacture, or kit, for use in increasing penile blood flow and/or enhancing penile erection. The kit can include in association, for example, an effective amount of an odorant and/or odorant mixture in a non-reactive, biocompatible carrier and/or optional additives as desired such as an antioxidant, preservative, and the like; and means for containing the odorant such as a vial, jar, pouch, can, bottle, cloth, aerosol can, blister pack, scratch-and-sniff odor patch, pen-like device, and the like. The containing means can include means for spraying by aerosolization or pumping. The kit can further include means for instructing the user about the use of the odorant and/or mixture to stimulate penile blood flow, in the form of a label or tag attached to the packaging and/or a printed package insert. The parts of the kit can be contained or separately packaged within a packaging material, such as a box or bag.

The invention will be further described by reference to the following detailed examples, wherein the methodologies are as described below. These examples are not meant to limit the scope of the invention that has been set forth in the foregoing description. Variation within the concepts of the invention are apparent to those skilled in the art. The disclosures of the cited references are incorporated by reference herein.

EXAMPLE

A randomized double-blind study was conducted to assess the effect of odorants on penile blood flow, a measure of the level of male excitation. Thirty-one men underwent penile blood flow measurements with a bi-directional doppler ultrasound while wearing masks with a total of 46 different odors and 2 control masks. All subjects underwent standardized smell tests. The brachial/penile index (BPI) with blank masks (as baseline) was compared with each odorized mask for each individual as well as for the group as a whole. Data was analyzed using the Wilcoxan Rank Sum Test and Spearman's Rank Correlation Coefficients.

The odors with the greatest increase in BPI were a mixture of lavender and pumpkin pie, doughnut and black licorice, and pumpkin pie and doughnut. In subjects with normal olfactory ability and whose partners wear cologne, lavender had the greatest impact on BPI ($p=0.03$). The ability for oriental spice ($p=0.01$), cola ($p=0.02$) and lavender ($p=0.02$) to increase BPI positively correlated with the number of times the subject had intercourse in the last month. The results showed that, in those men with a normal olfactory ability, a variety of odors can increase penile blood flow.

Testing Procedure. Thirty-one male volunteers from 18–64 years of age (mean 30.2) underwent olfactory testing with the University of Pennsylvania Smell Identification Test (UPSIT), a 40-question forced-choice, scratch-and-sniff identification test and the Chicago Smell Test, a 3-item detection and identification test (Doty et al., *Chemical Senses* 10:297–300 (1985); Hirsch et al., *Chemical Senses* 17:642–643 (1992); Hirsch et al., *Chemical Senses* 18 (5):570–571 (1993); Hirsch et al., *Chemical Senses* 18 (5):571 (1993)).

Each male subject was also queried as to sexual preferences, sexual practices, and odor hedonics. Questions

asked were as follows: age; marital status (s; m; w; d); height and weight; whether an odor made him recall his childhood and, if yes, what odor; if he wears a cologne and, if yes, what cologne; if he has diabetes; if he had any difficulty with obtaining an erection in the last 30 days and, if yes, the approximate number of times; if he smokes and, if yes, the number of cigarettes daily; favorite food (specific); least favorite food (specific); approximate number of times he had sexual intercourse in the last 30 days; approximate number of sexual partners in the last 30 days; sexual preference (male; female); how satisfied with his current sexual activity on a rating scale of 1-2-3-4-5, where 1=very unsatisfied and 5=satisfied; number of times he had an erection upon awakening within the last 30 days on a scale of 1-2-3-4-5, where 1=never, 3=sometimes, 5=always; and if there was a particular odor to cause him to have an erection within the last 30 days (yes, no) and, if yes, what odor.

Subjects underwent assessment of level of sexual arousal as determined by the brachial penile index (Laws et al., "The Penile Plethysmograph," in A Practioner's Guide to Treating the Incarcerated Male Sex Offender, pages 85–93, B. K. Schwartz and H. R. Cellini (eds.), U.S. Department of Justice, National Institute of Corrections, Washington D.C. (1988)). The test was performed with the FLOSCOPE ULTRA Pneumoplethysmograph following manufacturer's protocol (LifeSigns Corporation, "The PC Compatible FLOSCOPE ULTRA Vascular Lab", Minneapolis, Minn. (1994)). With this instrument, both penile and brachial blood pressures were measured and their ratio calculated, thus controlling for systemic effects. This allowed specific non-invasive assessment of penile blood flow.

All subjects underwent assessments as follows. After being attached to the plethysmograph, 3 minutes were allowed for acclamation to the experimental environment. Following this, a blank control mask was applied for 1 minute and then brachial penile index was recorded. The masks were made of 3-M paper surgical masks, and were designed to cover the nose and mouth. The mask was removed and then the 46 odorized masks were randomly presented in a double-blinded fashion. The odorized masks were prepared by applying about 1 drop of odorant to provide a non-irritant but suprathreshold level of the scent (i.e., a level wherein the subject could detect the odor was present, but was not so high as to be noxious or primarily trigeminal in nature. The odorants are shown in Table 1.

Each mask was worn for 1 minute, and brachial penile index was then recorded. There was then a 3-minute "wash-out" period between masks which involved breathing filtered air in a relative odor-free environment. At the end of the testing, an additional blank mask was worn for 1 minute, and a brachial penile index recorded. The effects of the odors were assessed by comparing brachial penile index with each individual odor as compared to the average of the control masks.

Statistical Analysis. The statistical analysis was provided by Sally Friels, Ph.D. of the University of Illinois School of Public Health, Chicago, Ill. Statistical significance was defined if a p value was less than or equal to 0.05. Data analysis included the following nonparametric tests: Signed Rank test, Wilcoxan Rank Sum Test, and Spearman's Rank Correlation Coefficient (T. Colton, *Statistics in Medicine*, Little Brown & Co., Boston, Mass. (1974)); E. L. Lehmann, *Nonparametrics: Statistical Methods Based on Ranks*, Holden-Day, New York, N.Y. (1975)).

Demographics. GENERAL: 77.4% (n=24) of the male subjects were single, 16.1% (n=5) were married, and 6% (n=2) were divorced. All subjects lived in Chicago and surrounding suburbs. Subjects were recruited through radio solicitation. All subjects were literate in English.

OLFACTION: In response to the questionnaire, 55% (n=17) of the subjects admitted to olfactory evoked nostalgic experience (A. R. Hirsch, *Advances in Consumer Research* 19:390–395 (1992)). 61% (n=19) did not smoke, 29% (n=9) smoked one ore less than one pack per day, and 10% (n=3) smoked between 1.1 to 2 packs per day. Given age and sex, UPSIT scores were graded based on published normal values (Doty et al., *Chemical Sense* 10:297–300 (1985)). Given these, 51% (n=16) had normal olfactory ability, whereas 48% (n=15) were microsmic or anosmic. 71% (n=22) customarily wore cologne. Of those who currently had regular sexual partners (n=23), 83% (n=19) of their partners customarily wore perfume or cologne.

SEXUAL: 74% (n=23) of the subjects had at least one regular sexual partner. None admitted to erection difficulties in the last 30 days. The frequency of intercourse over the last 30 days varied from zero in 19% (n=6) to 25 in 6% (n=2) described as having more than one sexual partner in the last 30 days. 87% (n=27) described heterosexual preference, whereas 13% (n=4) had homosexual preference. In describing level of sexual satisfaction on a scale of one to five, with five being most satisfied, 23% (n=7) described a maximum level of sexual satisfaction whereas 6.5% (n=2) described the lowest level of satisfaction with a median of three. As a means of assessing physiologic erectile function, frequency of morning erections was obtained. These were rated on a scale of one to five, one being absent and five being every morning. While 6% (n=2) described erections every morning, 3% (n=1) described the absence of morning erections, with a median of three. Most stated that odors never induced an erection (84%, or n=26), while 16% (n=5) admitted to odor-induced erection.

Results. The results are shown in Table 1 below. Sources of the odorants were Energy Essentials, IFF, AromaTech and essential oils.

The mixture of lavender and pumpkin pie odorants produced the greatest increase in median penile blood flow (40%). This was followed by the combination of black licorice and doughnut (31.5%), followed by pumpkin pie and doughnut (20%). The odor with the least effect on the median penile brachial index was cranberry which increased blood flow by 2%. Despite our hypothesis, no odor was found that reduced penile blood flow.

TABLE 1

Odorant/Odorant Mixture	Median*
Lavender and pumpkin pie	0.4000
Doughnut and black licorice	0.3150
Pumpkin pie and doughnut	0.2000
Orange	0.1950
Lavender and doughnut	0.1800
Black licorice and cola	0.1300
Black licorice	0.1300
Doughnut and cola	0.1250
Lily of the valley	0.1100
Buttered popcorn	0.0900
Vanilla	0.0900
Pumpkin pie	0.0850
Lavender	0.0800
Musk	0.0750
Cola	0.0700
Doughnut	0.0700
Peppermint	0.0600
Cheese pizza	0.0500
Roasting meat	0.0500
Parsley	0.0450

TABLE 1-continued

Odorant/Odorant Mixture	Median*
Cinnamon buns	0.0400
Green apple	0.0375
Rose	0.0350
Strawberry	0.0350
Oriental spice	0.0350
Baby powder	0.0325
Floral	0.0300
Chocolate	0.0275
Pink grapefruit	0.0250
Cranberry	0.0200

*Median penile blood flow

In those with normal olfactory ability, significant increase in brachial penile index correlated with (1) age and response to vanilla (p=0.05), (2) self assessed level of sexual satisfaction and response to strawberry (p=0.05), and (3) frequency of sexual intercourse and response to lavender (p=0.03), oriental spice (p=0.02) and cola (p=0.03).

Discussion. Although it was hypothesized that an odorant would be found that would reduce penile blood flow, no such odorant was identified. Such an odorant could be utilized to help decondition sex offenders. The results show that a hedonically positive odorant increased penile blood flow.

The present odors are not considered human pheromones which are believed to act upon the brain to cause an endocrinologic effect. Unlike pheromones, the present odorants that affected penile blood flow act immediately on the brain rather than in the slow manner of pheromones, or have an immediate psychological effect upon the brain.

There are several mechanisms by which the odorants may have affected penile blood flow. The odorants may have induced a Pavlovian conditioned response that reminded the subject of their sexual partners or their cooking and the associated mood states. Alternatively, odors may have induced a state of olfactory evoked recall. In a study of 989 people from 45 states and 39 countries, it was found that the odor that most induced olfactory evoked nostalgia response in those raised in the United States was that of baked goods (A. R. Hirsch, *Advances in Consumer Research* 19:390–395 (1992)). Although not wished to be held to any theory, odors that induced a nostalgic response and the associated positive mood state may have impacted upon penile blood flow. Or, the odors may have induced relaxation. Green apple has been suggested to reduce anxiety, and lavender, which increases alpha waves posteriorly, has been associated with a relaxed state (H. Sugano, *JASTS* XXII:8 (Abstract) (1988); J. R. King, "Anxiety reduction using fragrances," in *The Psychology and Biology of Fragrance*, pages 147–165, Van Toller and Dodd (eds.), Chapman and Hall, Ltd., London (1988)). Under a condition of reduced anxiety, inhibitions may have been removed and penile blood flow increased.

Alternatively, odors may have awakened the reticular activating system. Studies have indicated that jasmine increases beta waves frontally, and this is associated with a more alert state (Sugano (1988), supra). By making an individual more awake and alert, the odors may have caused subjects to be more aware of their entire environment, including any sexual cues around them, thus increasing penile blood flow.

Another possible mechanism is that the odorants may have acted neurophysically. It has been demonstrated that stimulation of the septal nucleus in the squirrel monkey induces erection (P. D. MacLean, "Cerebral evolution of emotion," in Lewis and Haviland (eds.), *Handbook of Emotions, page* 77, The Guilford Press, New York, N.Y. (1993)). A direct pathway connects the olfactory bulb to the septal nucleus (P. D. MacLean, *A Triune Concept of the Brain and Behavior*, page 14, University of Toronto Press, Toronto (1973)). Thus, it appears anatomically correct that odor may impact upon the septal nucleus and induce erection with associated increase in penile blood flow.

A direct physiologic mechanism may also play a role in the present method. One subject slept through the entire testing period, yet still showed the greatest increase in penile blood flow with the odors of the combination of lavender and pumpkin pie.

Alternatively, increased aggression through septal nucleus stimulation may be the primary effect. The increased penile blood flow may act not as a measure of direct sexual excitation, but may be the result of a "neighborhood effect" of induced aggression (Donatucci and Lue, "Physiology of Penile Tumescence," in *The Penis*, page 19, Hashmat and Das (eds.), Lea and Febiger, Philadelphia, Pa. (1993)).

In addition, a generalized parasympathetic effect, rather than specific sexual excitation, may act to increase penile blood flow. Primitive humans congregated around food kills, and there they had the greatest chance to procreate (J. Diamond, *The Third Chimpanzee: the evolution and future of the human animal*, page 68, Harper Collins Publisher, New York, N.Y. (1992). Thus, an increase in penile blood flow in response to food odors may have held a selective advantage for survival, and such a trait would be selected for through evolution.

Neuromechanisms for sexual excitation and penile erection. All natural functions are controlled by the nervous system, and the sexual response cycle is ultimately dependent on an intact neurophysiologic substrate. The sexual action can be viewed in the framework of Sherrington's reflex arc as a complicated knee jerk (W. Pryse-Phillips, *Companion to Clinical Neurology*, pages 785–786, Little, Brown and Company, Boston, Mass. (1995)).

There are several components that are involved. There is an afferent component of the sexual reflex arc which is activity by a diverse variety of exogenous stimuli: the primary stimulus consists of erotic visual, auditory, olfactory and tactile sensations. In addition, internal imagery, as well as REM periods of sleep, can serve as a primary stimulus of the sexual reflex. Each of these modes of activation act through different locations in the nervous system throughout the body. These stimuli are processed through specialized areas of the neocortex, limbic system and spinal cord, and then input into a final common pathway of sexual behavior. The efferent limb of the reflex arc involves a synchronized response of the voluntary and autonomic nervous system. Sexual stimulating odors rapidly traverse the afferent arc entering the limbic system and its neocortical connections.

There is also evidence that indicates that there is a direct connection between the olfactory bulb and the vomeronasal organ of the brain. In subhuman primates, the vomeronasal is where pheromones act (E. B. Keverne, "Pheromones and sexual behavior," in *Handbook of Sexology*, Money and Musaph (eds.), Elsevier/Horth-Holland Biomedical Press (1977)).

Thus, there are several pathways through which odors may impact upon sexual function. These pathways include: inducing memory through hippocampi connections, inducing direct penile effects through olfactory bulb septal nuclei connections, and/or affecting potential pheromonal action on the hypothalamus via the vomeronasal organ.

What is claimed is:

1. A method of increasing penile blood flow in a male individual, comprising:

administering to the male by inhalation of an odorant in an amount effective to increase penile blood flow;

the odorant selected from the group consisting of orange, a mixture of lavender and pumpkin pie a mixture of doughnut and black licorice, a mixture of pumpkin pie and doughnut lily of the valley, black licorice, a mixture of doughnut and cola, a mixture of black licorice and cola, a mixture of lavender and doughnut, chocolate, strawberry, rose, green, apple, parsley, peppermint, musk lavender, vanilla, cranberry, pink grapefruit, floral, baby powder, oriental spice, cinnamon buns, roasting meat, cheese pizza, doughnut, cola, pumpkin pie, and buttered popcorn.

2. A method of increasing penile blood flow in a male individual, comprising:

administering to the male by inhalation of an odorant in an amount effective to increase penile blood flow;

the odorant selected from the group consisting of a mixture of lavender and pumpkin pie, a mixture of doughnut and black licorice, and a mixture of pumpkin pie and doughnut.

3. A method of increasing penile blood flow in a mile individual, comprising:

administering to the male by inhalation of an odorant in an amount effective to increase penile blood flow;

wherein the odorant is selected from the group consisting of a doughnut odorant, a cinnamon buns odorant, a pumpkin pie odorant, a cola odorant, and an odorant mixture comprising one or more of those odorants.

4. An article of manufacture, comprising:

(a) an odorant as recited in claim **1** packaged within a container, wherein the odorant when inhaled by a male individual is effective to increase penile blood flow; and

(b) instructions for use of the odorant according to the method of claim **1**.

5. An article of manufacture, comprising:

(a) an odorant as recited in claim **2** packaged within a container, wherein the odorant when inhaled by a male individual is effective to increase penile blood flow in the male; and

(b) instructions for use of the odorant according to the method of claim **2**.

6. An article of manufacture, comprising:

(a) an odorant as recited in claim **3** packaged within a container, wherein the odorant when inhaled by a male individual is effective to increase penile blood flow; and

(b) instructions for use of the odorant according to the method of claim **3**.

7. The method of claim **1**, wherein the odorant is administered in a form selected from the group consisting of a scented cloth, a liquid or solid form contained in a vessel having a cap, an aerosol spray, a pump-type spray, a nasal spray, a liquid or solid form contained in a blister pack, and microcapsules contained in a scratch-and-sniff odor patch.

8. The method of claim **1**, wherein the odorant is administered in a form selected from the group consisting of a lotion, cream, perfume, and cologne.

9. The method of claim **1**, wherein the odorant is administered by means of a pen-like dispenser containing the odorant in a liquid form.

10. The method of claim **2**, wherein the odorant is administered in the form selected from the group consisting of a scented cloth, a liquid or solid form contained in a vessel having a cap, an aerosol spray, a pump-type spray, a nasal spray, a liquid or solid form contained in a blister pack, and microcapsules contained in a scratch-and-sniff odor patch.

11. The method of claim **2**, wherein the odorant is administered in a form selected from the group consisting of a lotion, cream, perfume, and cologne.

12. The method of claim **2**, wherein the odorant is administered by means of a pen-like dispenser containing the odorant in a liquid form.

13. The method of claim **3**, wherein the odorant is administered in the form selected from the group consisting of a scented cloth, a liquid or solid form contained in a vessel having a cap, an aerosol spray, a pump-type spray, a nasal spray, a liquid or solid form contained in a blister pack, and microcapsules contained in a scratch-and-sniff odor patch.

14. The method of claim **3**, wherein the odorant is administered in a form selected from the group consisting of a lotion, cream, perfume, and cologne.

15. The method of claim **3**, wherein the odorant is administered by means of a pen-like dispenser containing the odorant in a liquid form.

16. A method of increasing penile blood flow in a male individual, comprising:

administering to the male by inhalation of an odorant in an amount effective to increase penile blood flow;

the odorant administered in a form selected from the group consisting of a scented cloth, a liquid or solid form contained in a vessel having a cap, an aerosol spray, a pump-type spray, a nasal spray, a liquid or solid form contained in a blister pack, and microcapsules contained in a scratch-and-sniff odor patch; and

the odorant selected from the group consisting of orange, a mixture of lavender and pumpkin pie, a mixture of doughnut and black licorice, a mixture of pumpkin pie and doughnut, lily of the valley, black licorice, a mixture of doughnut and cola, a mixture of black licorice and cola, a mixture of lavender and doughnut, chocolate, strawberry, rose, green apple, parsley, peppermint, musk, lavender, vanilla, cranberry, pink grapefruit, floral, baby powder, oriental spice, cinnamon buns, roasting meat, cheese pizza, doughnut, cola, pumpkin pie, and buttered popcorn.

17. The method of claim **16**, wherein the odorant is administered in a form selected from the group consisting of a lotion, cream, perfume, and cologne.

18. The method of claim **16**, wherein the odorant is administered by means of a pen-like dispenser containing the odorant in a liquid form.

19. A method of increasing penile blood flow in a male individual, comprising:

administering to the male by inhalation of an odorant in an amount effective to increase penile blood flow;

the odorant administered in a form selected from the group consisting of a scented cloth, a liquid or solid form contained in a vessel having a cap, an aerosol spray, a pump-type spray, a nasal spray, a liquid or solid form contained in a blister pack, and microcapsules contained in a scratch-and-sniff odor patch;

the odorant selected from the group consisting of orange, a mixture of lavender and pumpkin pie, a mixture of doughnut and black licorice, a mixture of pumpkin pie and doughnut, lily of the valley, black licorice, a mixture of doughnut and cola, a mixture of black licorice and cola, and a mixture of lavender and doughnut.

20. The method of claim **19**, wherein the odorant is administered in a form selected from the group consisting of a lotion, cream, perfume, and cologne.

21. The method of claim 19, wherein the odorant is administered by means of a pen-like dispenser containing the odorant in a liquid form.

22. An article of manufacture, comprising:

(a) an odorant as recited in claim 16 and packaged in a recited form, wherein the odorant when inhaled by a male individual is effective to increase penile blood flow; and

(b) instructions for use of the odorant according to the method of claim 16.

23. An article of manufacture, comprising:

(a) an odorant as recited in claim 19 and packaged in a recited form, wherein the odorant when inhaled by a male individual is effective to increase penile blood flow; and

(b) instructions for use of the odorant according to the method of claim 19.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 5,885,614
DATED : MARCH 23, 1999
INVENTOR(S) : Alan R. Hirsch

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

At cols. 8-9, claim 1 should read as

--A method of increasing penile blood flow in a male individual, comprising:

administering to the male by inhalation of an odorant in an amount effective to increase penile blood flow;

the odorant selected from the group consisting of orange, a mixture of lavender and pumpkin pie, a mixture of doughnut and black licorice, a mixture of pumpkin pie and doughnut, lily of the valley, black licorice, a mixture of doughnut and cola, a mixture of black licorice and cola, a mixture of lavender and doughnut, chocolate, strawberry, rose, green apple, parsley, peppermint, musk, lavender, vanilla, cranberry, pink grapefruit, floral, baby powder, oriental spice, cinnamon buns, roasting meat, cheese pizza, doughnut, cola, pumpkin pie, and buttered popcorn.--

Signed and Sealed this

Seventeenth Day of August, 1999

Attest:

Attesting Officer

Q. TODD DICKINSON

Acting Commissioner of Patents and Trademarks

US005904916A

United States Patent [19]

Hirsch

[11] Patent Number: 5,904,916

[45] Date of Patent: May 18, 1999

[54] **USE OF ODORANTS TO ALTER LEARNING CAPACITY**

[76] Inventor: **Alan R. Hirsch**, 180 East Pearson, #4702, Chicago, Ill. 60611

[21] Appl. No.: **08/610,730**

[22] Filed: **Mar. 5, 1996**

[51] **Int. Cl.**[6] **A61K 9/12**

[52] **U.S. Cl.** **424/45**; 424/401; 424/402; 424/489; 424/76.1; 424/DIG. 5; 424/78.02; 514/937; 514/938; 514/963

[58] **Field of Search** ..... 424/45, 401, 402, 424/76.1, DIG. 5, 78.02, 195.1, 489; 514/937, 938, 963

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,759,521 6/1998 Hirsch 424/47

OTHER PUBLICATIONS

J. Borden, "This story stinks, but it might be quite lucrative, "*Crain's Chicago Business* , Metro Chicago's Business Authority (Dec. 2–8, 1991).

A.R. Hirsch, *Advances in Consumer Research* 19:390–395 (1992).

Hirsch, A.R. and L.H. Johnston, "Odors and Learning," The 17th Annual Meeting of the American Academy of Neurological and Orthopaedic Medicine and Surgery, Las Vegas, Nevada, Sep. 11, 1993, 35 pp.

J.R. King, "Anxiety Reduction Using Fragrances," *in The Psychology and Biology of Fragrance*, pp. 147–165, Van Toller & Dodd (eds.), Chapman and Hall, Ltd., London (1988).

A.R. Hirsch, "Enhancement of Learning with a Floral Odor," APA Annual Meeting Philadelphia, Pennsylvania, May 21–26, 1994, Abstract No. NR655, p. 227.

A. R. Genuaro. (1985). Remington's Pharmaceutical Sciences (17th edition). Mack Pub., pp. 1670–1677.

Primary Examiner—Raj Bawa

Attorney, Agent, or Firm—Godfrey & Kahn, S.C.

[57] **ABSTRACT**

The invention provides a method for enhancing learning in a person by the administration of a mixed-floral odorant. The odorant can be used as an adjuvant to improve learning and as an aid in education, and for rehabilitation of patients diagnosed with pathologically-induced learning disabilities.

13 Claims, No Drawings

USE OF ODORANTS TO ALTER LEARNING CAPACITY

BACKGROUND OF THE INVENTION

In order to compete in today's rapidly changing technologies and constant flow of new information, it is important to be able to quickly understand and appreciate various facts and information. The ability to learn information and perform tasks is important for children and adults alike, in order to succeed in school and on the job, and operate successfully in one's daily activities. Therefore, it would be beneficial to an individual be able to assimilate and understand new information faster and more proficiently.

Little information has been generated on the effects of odors on learning behavior. In one study, the odors of lavender and cloves were evaluated for their possible impact on learning. The results showed that those odorants did not affect memory or cognition, and that the odor of lavender actually impaired performance of arithmetic tasks. Ludvigson, H. W. and Rottman, T. R., *Chemical Senses* 14:525–536 (1989).

Accordingly, an object of the invention is to provide a method of enhancing a person's capacity for learning a task and/or other information. Another object is to provide means for altering a person's learning capacity that is in a form that is portable and can be easily carried or transported by the user for use at a remote location. Yet another object is to provide such a method and device that will be minimally disruptive to others who are in close proximity to the user.

SUMMARY OF THE INVENTION

These and other objects are achieved by the present invention which is directed to a method for enhancing the learning performance of a human through the delivery of an odorant substance for inhalation. In particular, the method involves delivering an amount of a substance having the characteristics of a mixed-floral odorant substance to the animal for inhaling to cause the capacity to learn and retain information to increase.

The mixed-floral odorant when administered to a person can alter the person's ability to learn and perform various tasks involving, for example, spatial analysis, motor control, alertness and/or concentration for an extended period of time, the manipulation of numbers, spatial memory, and/or to decrease a tendency to shift attention from one subject to another. Furthermore, the odorant can act to intensify "practice effect" in the process of memorizing new information. The mixed floral odorant is useful as an adjuvant to improve learning and as an aid in education, rehabilitation of patients diagnosed with pathologically-induced learning disabilities, and in psychotherapy for patients suffering from stroke or senile dementia of the Alzheimer's type, for example.

DETAILED DESCRIPTION OF THE INVENTION

According to the invention, it was found that by administering a particular mixed-floral odorant substance, a person's ability to learn a new task, including the assimilation of new information, was enhanced. It was found that administering the mixed-floral odorant significantly reduced the amount of time required to learn a task involving, for example, spatial analysis and memory, motor control and alertness and concentration. Such effect was observed by testing a subject, for example, according to the Halsted-Reitan Neuropsychological Test Battery, a trail-making subtest that tests a subject for their ability to determine the quickest path in a maze.

The mixed-floral odorant is a formulation of floral odorants preferably composed of a fresh, citrus, herbaceous, fruity, and floral odorant that will cause an enhancement in learning capacity of a subject. A useful mixed-floral odorant is a synthetic odorant commercially available, for example, from International Flavors and Fragrances, Inc. (IFF), New York, N.Y., as Mixed-Floral Odorant IFF No. 2635-AS.

According to the method, the mixed-floral odorant is administered to the subject for sniffing and inhalation into the nasal passageway, to deliver an amount of the odorant effective to enhance their learning capacity, which is a suprathreshold level of the scent but not so high as to become an irritant.

An odorant is presented at a suprathreshold level when the decismel level or concentration of the odorant is high enough to be detected by a normosmic individual. At its irritative level, the odorant quantity is so high and intense that the odorant stimulates predominantly the trigeminal nerve (for pain) rather than the olfactory nerve and, hence, is perceived as unpleasant, noxious or painful. The irritation threshold of the patient is the lowest concentration of the substance that causes immediate stinging or burning sensations in the nose, or stinging or lacrimation of the eye. (See, J. F. Gent, in *Clinical Measurement of Taste and Smell*, pages 107–166, H. L. Meiselman et al. (eds), 602 pp., MacMillan, NY (1986); R. L Doty et al., *Ann. Neurol.* 25: 166–171 (1989); E. Koss et al., *Neurology* 38: 1228–1232 (1988); R. Doty, *The Smell Identification Test: Administration Manual* 1983: 13–14, Philadelphia: Sensonics, Inc. (1983)).

The precise magnitude of a loss of smell may be determined by means of an odor threshold test. According to that test, an odorant substance such as butyl alcohol, phenyl ethyl alcohol or pyridine, is combined in an odorless liquid medium to provide a series of dilutions, or binary steps, of the odorant. For each successive binary step up the dilution scale, the odorant is present, for example, at one half the concentration of the preceding step. The highest concentration of the odorant usually provides the substance at an irritant level. The patient is presented with the series of dilutions in ascending order, and is asked to compare each dilution step to at least one control stimulus, such as odorless propylene glycol.

As used herein, a "normosmic" individual is able to detect the odor of an odorant substance without irritant sensations when the substance is presented at a concentration within a range of the average normal threshold for the substance. A "hyposmic" individual is one who has a reduced capacity of the olfactory nerve being able to detect an odorant substance by its odor at a concentration, or decismel level, above that of a normosmic individual yet below its irritant concentration level. An "anosmic" individual is one who has essentially no olfactory nerve capacity being unable to detect the odor of the odorant substance, but has trigeminal nerve function, being able to detect an odorant substance by means of irritant, tingling sensations when it is present at an irritant concentration. A patient who is able to detect pyridine vapor by means of irritant, tingling sensations caused by stimulation of the trigeminal nerve, but who cannot distinguish a pyridine odor at a lower concentration without such sensation, is considered to be anosmic having no olfactory nerve sensitivity.

The effect of the mixed-floral odorant can be assessed objectively by administering a test to the subject repetitively

to measure their initial learning performance on a task, and then re-testing the individual's ability to learn a similar task repetitively after being given the odorant, or vice-versa. The effectiveness of the mixed-floral odorant on the subject can be observed by comparing the amount of time required for the person to learn a task before and after inhaling the odorant.

Administration of the mixed-floral odorant to a subject will improve learning of a task such that, in subsequent undertakings, a normosmic person for whom the odor is hedonically positive, is able to complete the task in less time compared to the initial undertaking of the task. Preferably, a normosmic person administered the odorant shows an improvement from a first try to a third try of a task of about twice the speed for completing the task without the odorant. Preferably, a normosmic person given the mixed-floral odorant will complete a task by about 25–35% less time on a third try, or about 30% less time, compared to the initial undertaking of the task. A normosmic subject not given the mixed-floral odorant is able to reduce the time needed to complete a task on a third try compared to the initial try by only about 12–15% less time, averaging about 14% less time.

A normosmic person who finds the odorant hedonically positive is also able to complete the task faster on a third try when administered the odorant compared to normosmics who find the odorant hedonically negative. For normosmics who consider the odor hedonically negative, task completion time of a third subsequent attempt is about 9–10% less time with the mixed-floral odorant and an about 8% reduction without the odorant.

The use of the mixed-floral odorant is useful in enhancing learning in a person with a primary learning disability or a pathologically-induced learning disability. Examples of primary learning disabilities include dyslexia and attention deficit disorder (ADD). Examples of pathological conditions that can induce a learning disability include stroke, head trauma, senile dementia of the Alzheimer's type, multi-infarct dementia, Huntington's chorea, Parkinson's disease, and progressive supranuclear palsy.

The odorant can be administered to improve the learning capacity of an employee at work, a student in an educational setting, and the like, who has normal learning capacity or a primary learning disability; to assist in the rehabilitation of a patient with a pathologically-induced learning disability; and to increase the learning of tasks such as map localization, geography, object manipulation, and the like.

The mixed-floral odorant can be delivered in the form of a liquid solution, aerosol spray, solid, microcapsules, or other suitable form to deliver a suprathreshold amount of the odorant for sniffing by the person. The odorant substance can be administered in combination with an odorless liquid carrier such as mineral oil or water, and can be formulated with a viscosity effective to allow for aerosolization. The odorant can be dispensed, for example, by means of a cloth material that is coated with the odorant, as a solid or liquid form contained in a capped vessel, from an aerosol or pump-type spray device, as a nasal spray, by opening a blister pack or scratch-and-sniff odor patch containing the odorant in the form of microspheres, from a pen-like dispenser containing a liquid form of the odorant adsorbed to a wicking material, and the like.

To deliver the odorant, the user can employ a device that is portable and minimally disruptive of bystanders. The odorant can also be administered to a group of people within a confined area, for example, by pumping air containing the mixed-floral odorant through an air vent, spraying the odorant substance into the air as a mist or dry powder using an aerosol or non-aerosol spray, and the like.

The multi-floral odorant substance can be packaged as a part of an article of manufacture, or kit, for use in enhancing learning. The kit can include in association, for example, an effective amount of the mixed-floral odorant substance in a non-reactive, biocompatible carrier and/or optional additives as desired such as an antioxidant, preservative, and the like; and means for containing the odorant such as a vial, jar, pouch, can, bottle, cloth, aerosol can, blister pack, scratch-and-sniff odor patch, pen-like device, and the like. The containing means can include means for spraying by aerosolization or pumping. The kit can further include means for instructing the user about the use of the multi-floral odorant substance to enhance a person's learning ability, in the form of a label or tag attached to the packaging and/or a printed package insert. The parts of the kit can be contained or separately packaged within a packaging material, such as a box or bag.

The invention will be further described by reference to the following detailed examples, wherein the methodologies are as described below. These examples are not meant to limit the scope of the invention that has been set forth in the foregoing description. Variation within the concepts of the invention are apparent to those skilled in the art. The disclosures of the cited references are incorporated by reference herein.

EXAMPLE

Subjects. Twenty-two subjects, 12 males and 10 females ranging from 15–65 years of age (mean 36, median 34) participated in the experiment. All subjects were given the Chicago Smell Test and the Pyridine-Threshold Test of Amoore to establish that their olfactory ability was normal (A. R. Hirsch and M. B. Gotway, *Chemical Senses* 18(5) :570–571 (1993); A. R. Hirsch, M. B. Gotway and A. T. Harris, *Chemical Senses* 18(5):571 (1993); A. R. Hirsch and D. R. Cain, *Chemical Senses* 17(5):p. 642–3 (1992); and Amoore et al., *Rhinology* 21:49–54 (1983)).

Test and Procedure. Two trail-making (maze) tests modified from the trail-making subtest of the Halsted-Reitan Neuropsychological Test Battery used to detect neurological problems were used (Reitan, R. M., "Halsted-Reitan Neuropsychological Test Battery," Neuropsychology Laboratory, University of Arizona, Tucson, Ariz. (1979)). Trail B was used, but the numbers were randomly changed on one of the mazes to avoid any cross-over learning effect.

Subjects were told that they would be tested for their ability to complete the maze test while wearing masks. The masks were made of 3-M paper surgical masks, and were designed to cover the nose and mouth. Prior to testing, subjects accustomed themselves to the masks or the distracting effect of any odor by wearing an unscented or scented mask for one minute prior to testing. Subjects then underwent testing in randomized, double-blinded fashion, with two trail-making (maze) tests modified as described above. Each subject underwent the trials twice: once while wearing an unscented mask and once wearing a floral-scented mask. The scented masks were prepared by applying one drop of the mixed floral odorant, resulting in a suprathreshold level of scent (i.e., a level that was high enough that subjects could detect an odor was present).

The mixed-floral odorant was an artificial floral odor IFF No. 2635-AS from International Flavors and Fragrances, Inc. (IFF), New York, N.Y.

The order of presentation of the scented versus unscented masks was random, but the order of maze presentation was constant. Subjects always performed first the trail-making subtest of the Halsted-Reitan Battery, Part B (three times), followed by the modified trail-making subtest of the Halsted-Reitan Battery, Part B (three times). Each subject attempted the set of two mazes a total of three times sequentially with each mask. The time required to complete each trial was measured.

Statistical Analysis. The percent change in the time required to complete the second and third trials compared to the first trial was analyzed using Mann-Whitney U, Spearman rank correlation, and Wilcoxon rank sum tests for nonparametric data.

Results. The characteristics of the 22 volunteers are shown in Table 1 below. Subject number 16 failed the pyridine-threshold test of Amoore and was therefore considered impaired in olfactory ability. Of the 21 normosmic subjects, 10 subjects considered the mixed-floral scent hedonically positive. The other 11 subjects considered the odorant either neutral or hedonically negative.

TABLE 1

Characteristics of Subiects

Subject No.	Sex	Age	Smoker	Floral Odor Hedonics	Olfactory Test of Amoore Pyridine Threshold (decismels)*
1.	M	23	N	positive	25
2.	F	43	Y	negative	25
3.	M	43	N	positive	25

TABLE 1-continued

Characteristics of Subiects

Subject No.	Sex	Age	Smoker	Floral Odor Hedonics	Olfactory Test of Amoore Pyridine Threshold (decismels)*
4.	M	32	N	negative	25
5.	M	15	N	negative	25
6.	F	37	Y	positive	25
7.	F	26	N	positive	25
8.	F	35	N	positive	25
9.	M	26	N	positive	25
10.	F	31	N	indifferent	25
11.	F	35	Y	positive	25
12.	F	55	Y	indifferent	25
13.	F	25	Y	positive	25
14.	M	39	Y	indifferent	25
15.	M	25	N	indifferent	25
16.	M	23	N	positive	25
17.	M	26	N	positive	25
18.	M	33	Y	negative	25
19.	M	62	N	negative	25
20.	F	54	Y	positive	25
21.	F	38	N	negative	25
22.	M	65	N	negative	25

*Normal range is −25 to +25 decismels.

Table II below shows the amount of time in seconds taken by each subject to complete each of the three trials both with the scented masks and with unscented masks.

TABLE II

	UNSCENTED TRIALS							SCENTED TRIALS						
Subj. No.	Order of Presentation	Trial 1 sec.	Trial 2 sec.	Trial 3 sec.	% delta trial 1–2	% delta trial 2–3	% delta trial 1–3	Order of Presentation	Trial 1 sec.	Trial 2 sec.	Trial 3 sec.	% delta trial 1–2	% delta trial 2–3	% delta trial 1–3
1.	first	38.4	27.7	25.7	−27.9%	−7.2%	−33.1%	second	53.1	30.6	30.2	−42.4%	−1.3%	−43.1%
2.	second	46.2	57.2	41.9	+23.8%	−26.7%	−9.3%	first	54.7	43.3	56.7	−20.8%	+30.9%	+3.7%
3.	first	72.5	57.9	51.9	−20.1%	−10.5%	−28.4%	second	74.2	53.4	42.4	−28.0%	−20.6%	−42.9%
4.	second	38.0	38.0	32.2	0%	−15.3%	−15.3%	first	49.6	37.4	34.4	−24.6%	−8.0%	−30.6%
5.	first	82.8	57.9	64.7	−30.1%	+11.7%	−21.9%	second	53.6	48.6	44.8	−9.3%	−7.8%	−16.4%
6.	second	33.9	32.0	31.4	−5.6%	−1.9%	−7.4%	first	51.3	35.3	42.9	−31.2%	+21.5%	−16.4%
7.	first	50.4	40.6	40.1	−19.4%	−1.2%	−20.4%	second	44.1	46.9	42.7	+6.3%	−9.0%	−3.2%
8.	second	35.0	33.1	43.2	−5.4%	+30.5%	+23.4%	first	34.0	26.4	24.8	−22.4%	−6.1%	−27.1%
9.	first	32.8	26.8	33.9	−18.3%	+26.5%	+3.4%	second	34.5	25.1	25.1	−27.2%	0%	−27.2%
10.	second	60.1	53.2	40.4	−11.5%	−24.1%	−32.8%	first	59.1	87.1	59.2	+47.4%	−32.0%	+0.2%
11.	first	75.1	63.1	58.0	−16.0%	−8.1%	−22.8%	second	67.3	43.8	42.2	−34.9%	−3.7%	−37.3%
12.	second	57.6	57.7	61.5	−0.2%	+6.6%	+6.8%	first	75.5	126.6	48.4	+67.7%	−61.8%	−35.9%
13.	first	55.5	63.3	44.6	+14.1%	−29.5%	−19.6%	second	41.1	41.8	32.0	+1.7%	−23.4%	−22.1%
14.	second	49.5	45.8	35.3	−7.5%	−22.9%	−28.7%	first	52.2	53.8	48.1	+3.1%	−10.6%	−7.9%
15.	first	40.9	35.7	37.2	−12.7%	−4.2%	−9.0%	second	28.3	26.0	33.7	−8.1%	+29.6%	+19.1%
16.	second	37.5	38.9	25.3	+3.7%	−35.0%	−32.5%	first	49.3	31.5	38.6	−36.1%	+22.5%	−21.7%
17.	second	44.3	46.8	39.4	+5.6%	−15.8%	−11.1%	first	74.9	45.3	42.6	−39.5%	−6.0%	−43.1%
18.	first	93.8	91.9	77.4	−2.0%	−15.9%	−17.5%	second	77.5	55.8	54.9	−28.0%	−1.6%	−29.2%
19.	second	47.9	59.9	52.8	+25.1%	−11.9%	+10.2%	first	50.9	58.6	64.5	+15.1%	−10.1%	+26.7%
20.	first	75.2	54.1	63.6	−28.1%	+17.6%	−15.4%	second	70.1	44.0	43.1	−37.2%	−2.0%	−38.5%
21.	second	46.2	39.3	56.6	−14.9%	+44.0%	+22.5%	first	60.3	47.8	52.8	−20.7%	+10.5%	−12.4%
22.	first	56.3	45.8	58.9	−18.7%	+28.6%	+4.6%	second	59.9	36.8	44.3	−38.6%	+20.4%	−26.0%

As shown in Table III below, normosmics who found the odor hedonically positive (n=10) displayed a significant improvement in learning in the presence of the mixed-floral odorant. On subsequent trials, these subjects learned to complete the tasks in an average of 30.1% less time in the presence of the odor. In the trials without the odor, they learned to complete the tasks on an average of only 13.1% less time. In other words, they learned to complete the tasks on an average of 17% less time in the presence of the mixed-floral odorant than in the non-odorized condition.

TABLE III

Normosmic Subjects with Positive Hedonics

	UNSCENTED TRIALS							SCENTED TRIALS						
Subj. No.	Order of Presentation	trial 1 sec.	trial 2 sec.	trial 3 sec.	% delta trial 1–2	% delta trial 2–3	% delta trial 1–3	Order of Presentation	trial 1 sec.	trial 2 sec.	trial 3 sec.	% delta trial 1–2	% delta trial 2–3	% delta trial 1–3
1.	first	38.4	27.7	25.7	−27.9%	−7.2%	−33.1%	second	53.1	30.6	30.2	−42.4%	−1.3%	−43.1%
3.	first	72.5	57.9	51.9	−20.1%	−10.5%	−28.4%	second	74.2	53.4	42.4	−28.0%	−20.6%	−42.9%
6.	second	33.9	32.0	31.4	−5.6%	−1.9%	−7.4%	first	51.3	35.3	42.9	−31.2%	+21.5%	−16.4%
7.	first	50.4	40.6	40.1	−19.4%	−1.2%	−20.4%	second	44.1	46.9	42.7	+6.3%	−9.0%	−3.2%
8.	second	35.0	33.1	43.2	−5.4%	+30.5%	+23.4%	first	34.0	26.4	24.8	−22.4%	−6.1%	−27.1%
9.	first	32.8	26.8	33.9	−18.3%	+26.5%	+3.4%	second	34.5	25.1	25.1	−27.2%	0%	−27.2%
11.	first	75.1	63.1	58.0	−16.0%	−8.1%	−22.8%	second	67.3	43.8	42.2	−34.9%	−3.7%	−37.3%
13.	first	55.5	63.3	44.6	+14.1%	−29.5%	−19.6%	second	41.1	41.8	32.0	+1.7%	−23.4%	−22.1%
17.	second	44.3	46.8	39.4	+5.6%	−15.8%	−11.1%	first	74.9	45.3	42.6	−39.5%	−6.0%	−43.1%
20.	first	75.2	54.1	63.6	−28.1%	+17.6%	−15.4%	second	70.1	44.0	43.1	−37.2%	−2.0%	−38.5%
	Avg.	51.3	44.5	43.2	−12.1%	+0.4%	−13.1%		54.5	39.3	36.8	−25.5%	−5.1%	−30.1%

Normosmics who found the odorant hedonically negative (n=7) also displayed a slight, but statistically non-significant improvement in learning in the presence of the odorant. An average of 9.9% reduction in time was needed by this group to complete the trial in the presence of the odorant versus 8.2% reduction in time without the odorant.

Results did not differ significantly for the 21 normosmic subjects due to the order of presentation of scented versus unscented masks ($p>0.05$), the subject's sex ($p>0.05$), their smoking status ($p>0.5$), or their ages ($p=0.06$).

For the subjects who found the odorant hedonically positive, the odorant had the greatest impact on learning from the first to second trial. The average improvement with the scented masks was 25.5% less time for the second trial compared to the first, and with the unscented masks only 12.1% less time ($t=9$, critical value=8, "=0.05, 2-tail). From the second to the third trial, the average time required was 5.1% less with the scent while the performance with unscented masks actually worsened, requiring slightly more time for the third trial than for the second ($t=19$, critical value=8, "=0.05, 2-tail). Hence, the presence of the odor continued substantially to improve relative performance from the second to the third trial, while in the absence of odor, performance slightly worsened.

Discussion. Subjects with normal olfactory ability who considered the odorant hedonically positive demonstrated that on subsequent trials they learned to complete the tasks 17% faster on average in the presence of the floral odor than in the non-odorized condition. The improvement was greatest from the first to the second trial. Although the odorant had a diminished effect from the second trial to the third trial, the effect of the odorant remained statistically significant from the second to third trial.

Pre-testing of subjects with other odors, i.e., oriental spice (IFF 2245-HS), baked goods (IFF 2292-AS), lavender (essential oils), citrus (IFF 2898-HS), parsley (Aroma Tech 236938), and spearmint (essential oils), showed no effect on learning time in the trail-making test even though the subjects considered those odorants hedonically positive. This shows that positive hedonics alone are insufficient to improve learning. By comparison, the mixed floral scent caused a significant improvement in learning. This shows that the characteristics of the odor are essential.

Learning involves a multitude of integrated neurologic functions and, although not wished to be held to any theory, the mixed-floral odorant may have facilitated deposition of short term memory, the processing of newly learned material, or the access of these memories for subsequent tasks, or could have facilitated the creation of new strategies for solution of problems. In addition, learning depends upon multiple variables: attention, interest, underlying neurologic substrate, task difficulty, competing environmental distractions, and the inherent baseline emotional state of the organism which is a function of the limbic system. Learning can be impacted by changes in attention (wakefulness), distraction, motivation, and mood.

For example, odors can act as competing stimuli thereby reducing concentration on the task. In that case, the distraction must be overcome before learning can occur. This was not the case with the mixed floral scent.

The odorant may increase the level of motivation in a classical Pavlovian conditioned response such that the odorant stimulus may induce recall of a past behavior or learning situation, and enhance (or hinder) the learning state in an individual who had a positive (or negative) learning experience associated with that smell.

The odorant may also have a direct physiologic impact upon brain structures that are involved in learning, i.e., the hippocampus and cortex. These areas are directly influenced by anatomic projections from the olfactory system. Pathology of these structures that are known to impair learning also affects olfactory ability, as for example with Korsakoff's syndrome, temporal-lobe epilepsy, and schizophrenia (prefrontal cortex). Other more diffuse neurologic diseases that impair both learning and olfaction include senile dementia of the Alzheimer's type and head injury.

The mixed-floral odorant may also modulate the same neurotransmitters that are involved in the processes of both learning and olfaction. Such neurotransmitters include

norepinephrine, dopamine, serotonin, acetylcholine, and GABA, as well as the hypophyseal neuropeptides and non-hypophyseal hormones. Examples of hypophyseal hormones include methionine-enkephalin and beta endorphin, and examples of the nonhypophyseal hormones include substance P, neurotensin and cholecystokinin.

Inhalation of odorants may increase norepinephrine discharge from the locus ceruleus, and the compound could act directly as a neurotransmitter to increase learning. Alternatively, norepinephrine could stimulate the reticular activating system, making the individual more alert and thus improve learning. Further, norepinephrine could act indirectly by causing an increase in attention, i.e., stress, secondarily causing an increase in vasopressin level.

Vasopressin, in addition to being released secondary to stress (alertness), may also be released from the olfactory bulb by the direct action of the odorant. This may further enhance alertness and memory, both of which can improve learning.

A third construct, acetylcholine (ACTH) is released when norepinephrine stimulates the reticular activating system, as in response to stress. The release of ACTH increases attention-enhanced learning. ACTH also causes release of cortisol which acts on those structures of the brain that are jointly involved in learning and olfaction. These include the amygdala, piriform cortex and entorhinal cortex. Thus, since a degree of alertness is necessary for learning, the mixed floral odor may have acted to stimulate the reticular activating system.

The mixed floral odorant may also improve learning by inducing a positive feeling which secondarily enhances cognition. It is known that exposure to odors experienced as hedonically positive produces a positive affective state and exposure to odors experienced as hedonically negative produces a negative affective state. Undoubtedly, a positive mood state would directly improve learning.

The odorant may also decrease excess anxiety, an inhibitor of learning, although too much relaxation may impair performance and a less relaxing odor may have an even greater positive effect on learning.

The impact of the mixed floral odorant may also be upon the limbic system itself as with jasmine or lavender odorants. Only one sensory system by definition is included within the limbic system and that is the olfactory system. Hence, the mixed floral odorant may impact on learning through limbic system functioning. Evidence indicates that odor affects mood. An odorant can induce recall of a scene from the past. By directly stimulating the limbic system, the odorant can act as an agent to induce recall, memory and nostalgia, and thus cause a change in learning.

Animal studies also indicate that drugs used to improve olfaction can also improve learning. For example, norepinephrine is a common neurotransmitter to both systems. Amphetamine, a norepinephrine agonist, has been shown to improve learning as well as olfaction in test animals. Similar effects may occur in human pathology. Acetylcholine is a neurotransmitter common to both the learning and olfactory systems, and phosphatidylcholine is known to increase central nervous system acetylcholine levels. Treatment with phosphatidylcholine may improve both functions in patients deficient in acetylcholine, i.e., those with senile dementia of the Alzheimer's type. Phosphatidylcholine has been used to correct both olfactory deficiencies in those with hyposmia and anosmia, and to improve functional ability in those with learning impairments due to senile dementia of the Alzheimer's type.

Likewise, dopamine is a neurotransmitter in both systems. Amantadine, a dopamine agonist may improve olfactory ability in those with olfactory loss and improve overall cognitive ability in those with Parkinson's disease. Another overlapping neurotransmitter is serotonin, dysregulation of which may cause depression. Amitriptyline, a 5HT agonist, improves both learning ability in those with depression and may also improve olfactory ability in those who are hyposmic. Milacemide (proglycine), a learning enhancing drug, may be an olfactory enhancing agent.

The trail-making test is a paradigm for the learning tasks of spatial analyses, motor control, attention shifting, alertness, concentration and number sense (Lishman, W. A., "Psychological Consequences of Cerebral Disorder," In: *Organic Psychiatry*, page 141, Blackwell Scientific Publications, Oxford (1978)). Brain damage at a various locations can impair trail-making, so it is logical that intervention at these locations could improve performance. The mixed floral odorant may have acted at any of these sites to improve learning.

The effect of the mixed floral odorant on improved spatial analysis/orientation is of particular interest. This cognitive process is localized in the right nondominant hemisphere. Likewise, olfaction is predominantly processed in the right nondominant hemisphere. Thus, the use of the mixed floral odorant is particularly useful for learning paradigms that involve the right hemisphere such as solving mazes, spatial design, puzzles, and peg-block tests.

The order of presentation of the scented and unscented masks had no effect on the results. In other words, there was no bias due to whether the odorized or blank mask was presented first. It was anticipated, based on a learning curve, that the second trail-making test would be completed faster even without any effect due to odor. However, no substantially significant improvement occurred with subjects wore the unscented masks.

The subject's sex and smoking status showed no significant effect on their performance in the study. It was anticipated that women and nonsmokers would show greater improvement than males and smokers on the basis that women and nonsmokers have better olfactory ability than males and smokers. This was due, at least in part, to the cognitive task not being sex dependent, and the levels of odorant used being sufficiently suprathreshold.

What is claimed is:

1. A method for enhancing learning in a normosmic person, comprising the following steps:

administering to the person by inhalation a suprathreshold but not irritant amount of a floral odorant; wherein inhaling an amount of said odorant enhances the capacity of said person to learn a task selected from the group consisting of spatial analysis, motor control, alertness, concentration, manipulation of numbers, and retention in memory of spatial orientation; and the amount of odorant administered is effective to enable the person to complete the task on a subsequent undertaking of the task by about 25–35% less time compared to a first undertaking of the task.

2. The method according to claim **1**, wherein the odorant is administered in a form selected from the group consisting of a solid or liquid contained in a capped vessel, spray, gas, scented cloth, lotion, cream, perfume, cologne, scratch-and-sniff odor patch containing microcapsules of the odorant, a blister pack containing the odorant, solid air freshener, potpourri, incense, lightbulb ring, candle, and combinations thereof.

3. The method according to claim 1, wherein the odorant is administered as an aerosol spray or nasal spray.

4. A method for enhancing learning in a normosmic person, comprising the steps of:

administering to the person by inhalation a suprathreshold but not irritant amount of a floral odorant to assist in the rehabilitation of a patient diagnosed as having a pathologically-induced learning disability; wherein inhaling an amount of said odorant enhances the capacity of said person to learn a task selected from the group consisting of spatial analysis, motor control, alertness, concentration, manipulation of numbers, and retention in memory of spatial orientation; and the amount of odorant administered is effective to enable the person to complete the task on a subsequent undertaking of the task by about 25–35% less time compared to a first undertaking of the task.

5. The method of claim 4, wherein the patient is diagnosed as having a pathologically-induced learning disability selected from the group consisting of a stroke, head trauma, senile dementia of the Alzheimer's type, multi-infarct dementia, Huntington's chorea, Parkinson's disease, and progressive supranuclear palsy.

6. A method for enhancing learning in a normosmic person, comprising the steps of:

administering to the person by inhalation a suprathreshold but not irritant amount of a floral odorant; said person diagnosed as having a primary learning disability; wherein inhaling an amount of said odorant enhances the capacity of said person to learn a task selected from the group consisting of spatial analysis, motor control, alertness, concentration, manipulation of numbers, and retention in memory of spatial orientation; and the amount of odorant administered is effective to enable the person to complete the task on a subsequent undertaking of the task by about 25–35% less time compared to a first undertaking of the task.

7. The method according to claim 6, wherein the person is diagnosed as having dyslexia or attention deficit disorder.

8. An article of manufacture, comprising, packaged together:

(a) the odorant as recited in claim 1, wherein said odorant when inhaled by a person is effective to enhance the capacity of the person to learn the task; and

(b) instructions for use of said odorant according to the method of claim 1.

9. The article of manufacture according to claim 8, wherein said odorant is packaged within a delivery means selected from the group consisting of a vial, jar, pouch, can, bottle, blister pack, and a scratch-and-sniff odor patch containing microcapsules of the odorant.

10. The article of manufacture according to claim 8, wherein said odorant is in a form selected from the group consisting of a cloth scented with said odorant, an aerosol spray, a pump-type spray, a nasal spray, a liquid or solid form of said odorant contained in a vessel having a cap, a liquid or solid form of said odorant contained in a blister pack, and microcapsules of said odorant contained in a scratch-and-sniff odor patch.

11. The article of manufacture according to claim 8, wherein said odorant is in the form of a cream or a cologne.

12. The article of manufacture according to claim 8, wherein said odorant is in a liquid form contained in a dispenser.

13. The article of manufacture according to claim 8, wherein said dispenser contains the odorant adsorbed to a wicking material.

* * * * *

US005324490A

United States Patent [19]

Van Vlahakis et al.

[11] Patent Number: 5,324,490

[45] Date of Patent: Jun. 28, 1994

"D"

[54] **DEODORANT CONTAINER AND PERFUMED STABLE GEL ASSEMBLY AND METHOD OF MANUFACTURE**

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[73] Assignee: **Eftichios Van Vlahakis**, Huntington Beach, Calif.

[21] Appl. No.: **970,122**

[22] Filed: **Nov. 2, 1992**

[51] **Int. Cl.**[5] **A61L 9/01**; A61L 9/12; A61L 9/04

[52] **U.S. Cl.** **422/305**; 422/5; 422/122; 239/55; 239/60; 261/DIG. 17; 424/76.4

[58] **Field of Search** ..... 239/55, 57, 60; 422/4, 422/5, 120, 122, 123, 305, 306; 424/76.2, 76.3, 76.4; 261/96, DIG. 17, DIG. 65; 220/652–653, 669, 674–675; 206/0.7

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,067,824	1/1978	Teng et al.	252/522
4,117,110	9/1978	Hautmann	424/76.3
4,137,196	1/1979	Sakurai et al.	252/522
4,178,264	12/1979	Streit et al.	422/5 X
4,755,377	7/1988	Steer	424/76.4
4,830,791	5/1989	Muderlak et al.	239/57 X
4,840,770	6/1989	Walz et al.	239/60 X
5,021,066	6/1991	Aeby et al.	8/408
5,026,958	6/1991	Palacios	220/669 X
5,034,222	7/1991	Kellett et al.	424/76.4
5,039,513	8/1991	Chatterjee et al.	424/47
5,047,234	10/1991	Dickerson et al.	424/76.4 X
5,060,858	10/1991	Santini	239/60

Primary Examiner—Robert J. Warden
Assistant Examiner—E. Leigh Dawson
Attorney, Agent, or Firm—Wallenstein, Wagner & Hattis, Ltd.

[57] **ABSTRACT**

The present invention relates to a perfumed stable gel and to a deodorant container which retains a deodorant in the form of that perfumed stable gel, and which is adapted for use with various deodorant dispensers. The present invention also relates to a method of manufacture for the perfumed stable gel and the deodorant container in a unitary form. Specifically, the invention relates to a disposable deodorant container which retains a perfumed stable gel comprised of a unique combination of chemical components. The stable gel can be maintained at temperatures of up to 140° F. and has a perfume content of up to 75%.

33 Claims, 7 Drawing Sheets

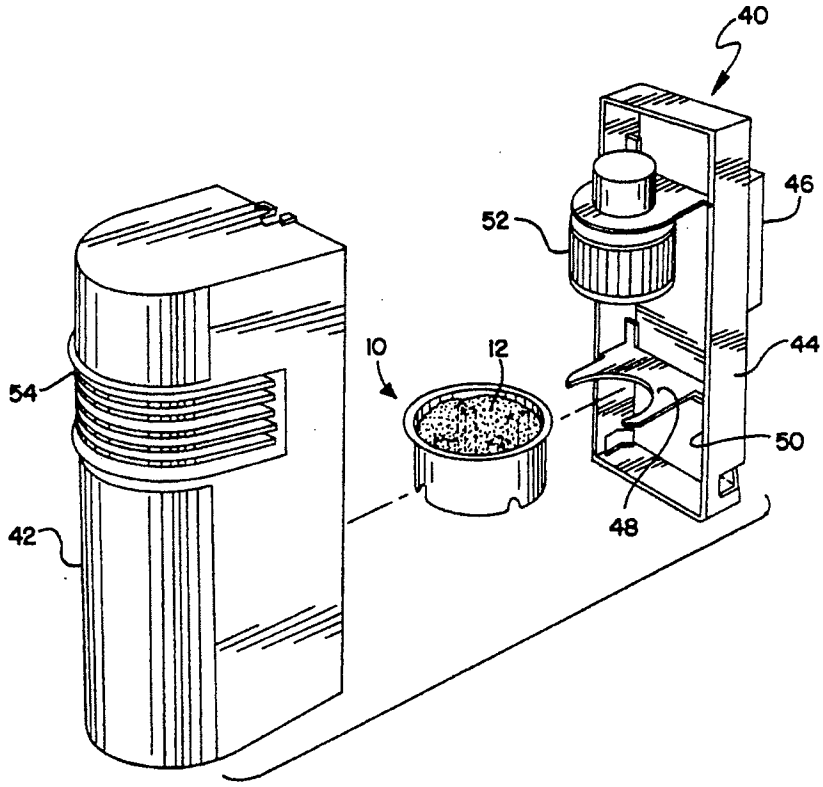


FIG. 2

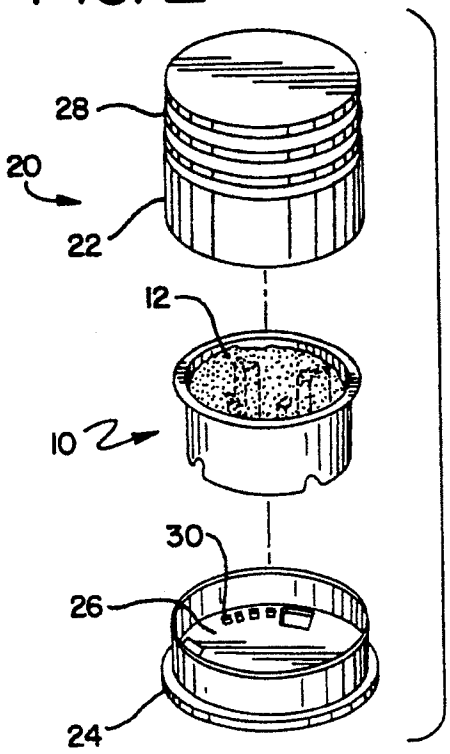


FIG. 1
PRIOR ART

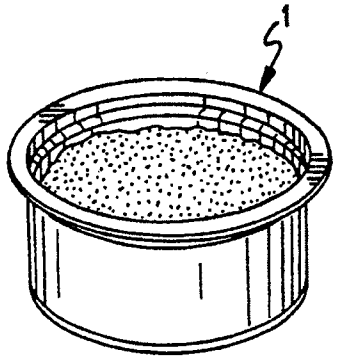


FIG. 3

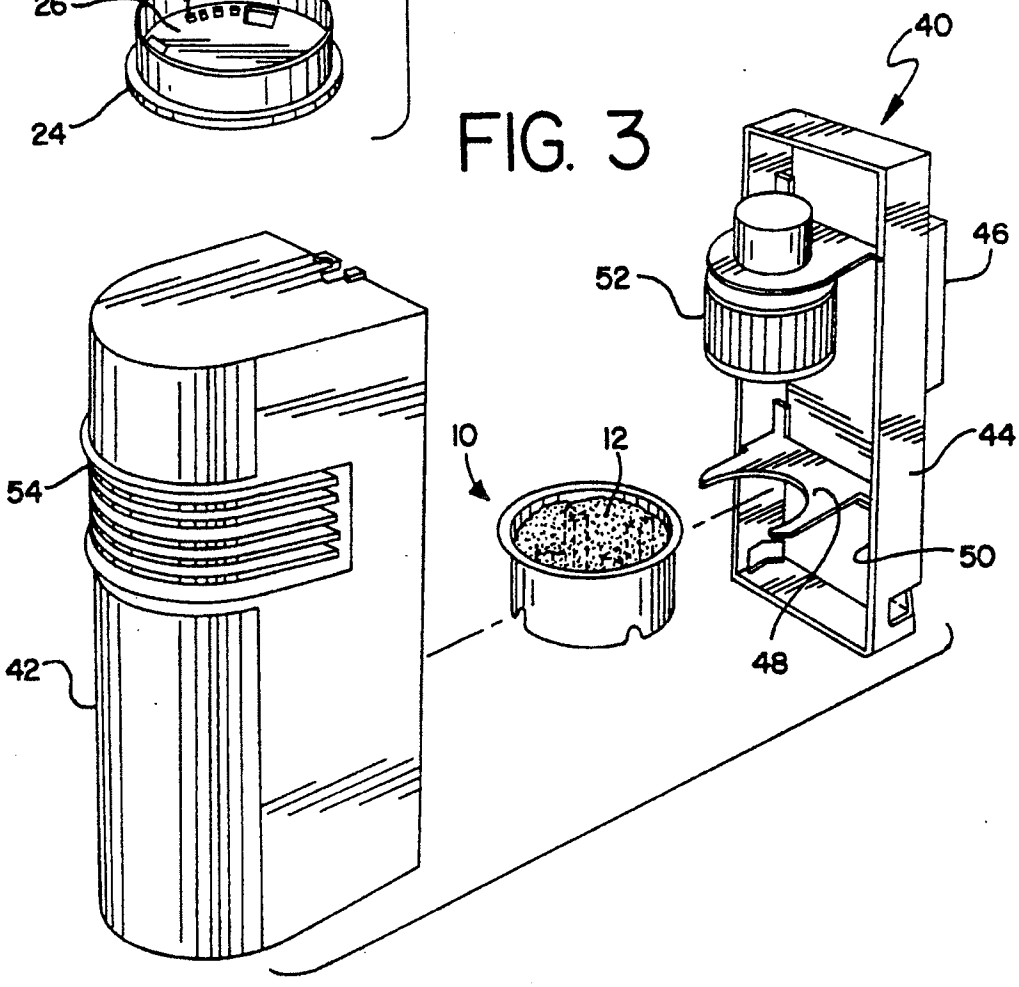


FIG. 4

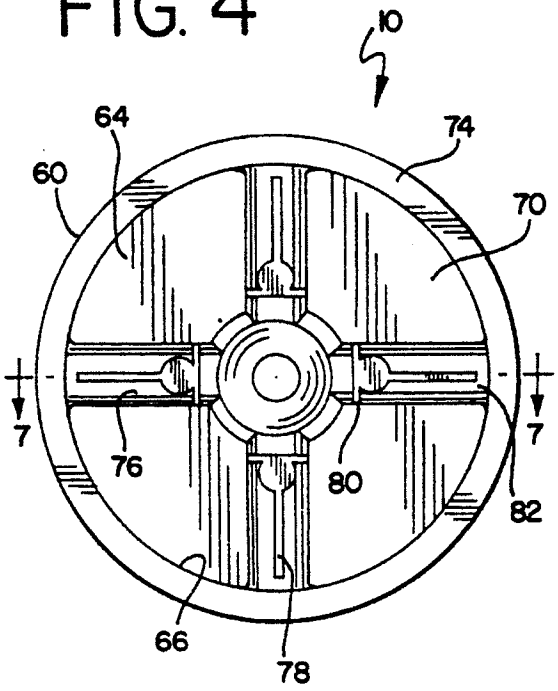


FIG. 5

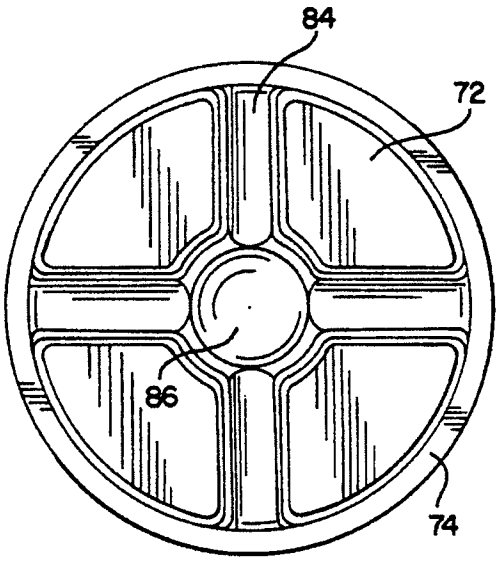


FIG. 6

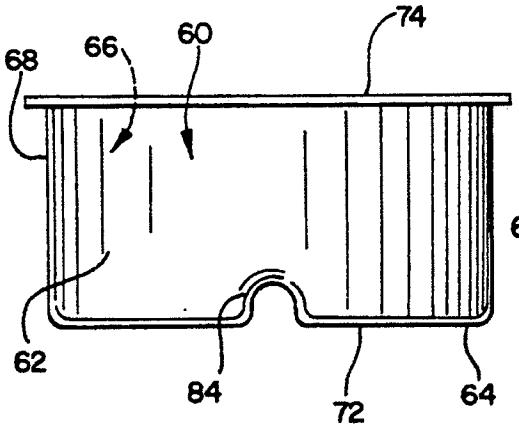


FIG. 7

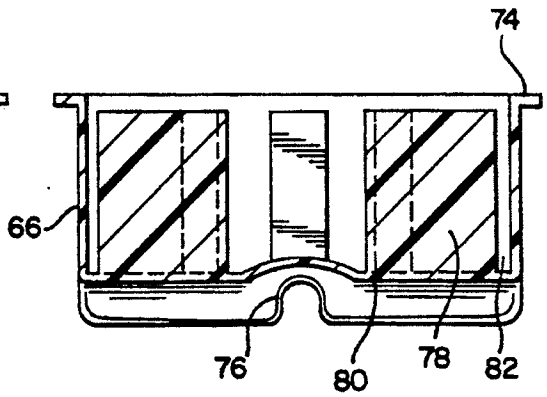


FIG.8

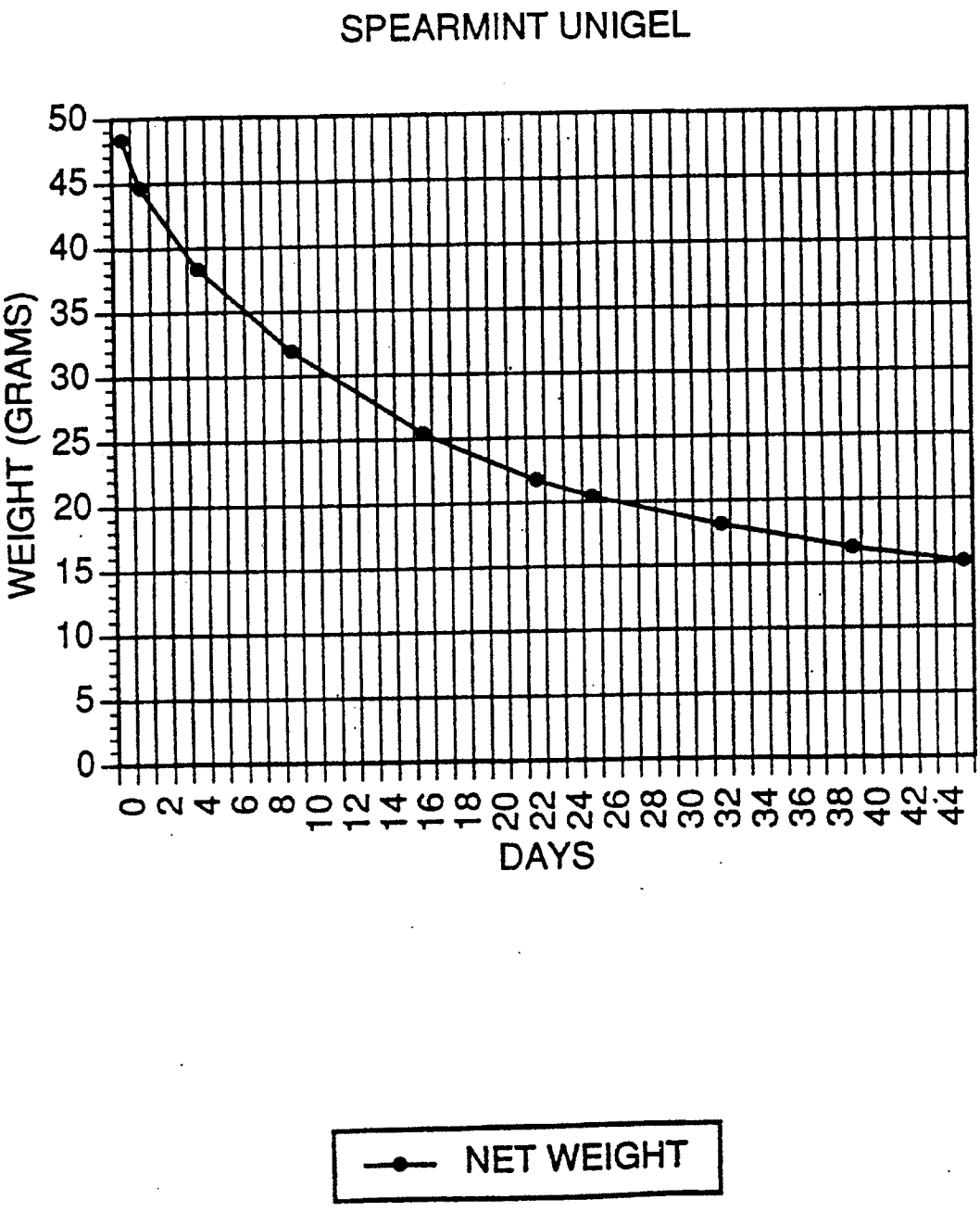

SPEARMINT UNIGEL
WEIGHT (GRAMS)
50
45
40
35
30
25
20
15
10
5
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44
DAYS
NET WEIGHT

FIG.9

JASMINE UNIGEL

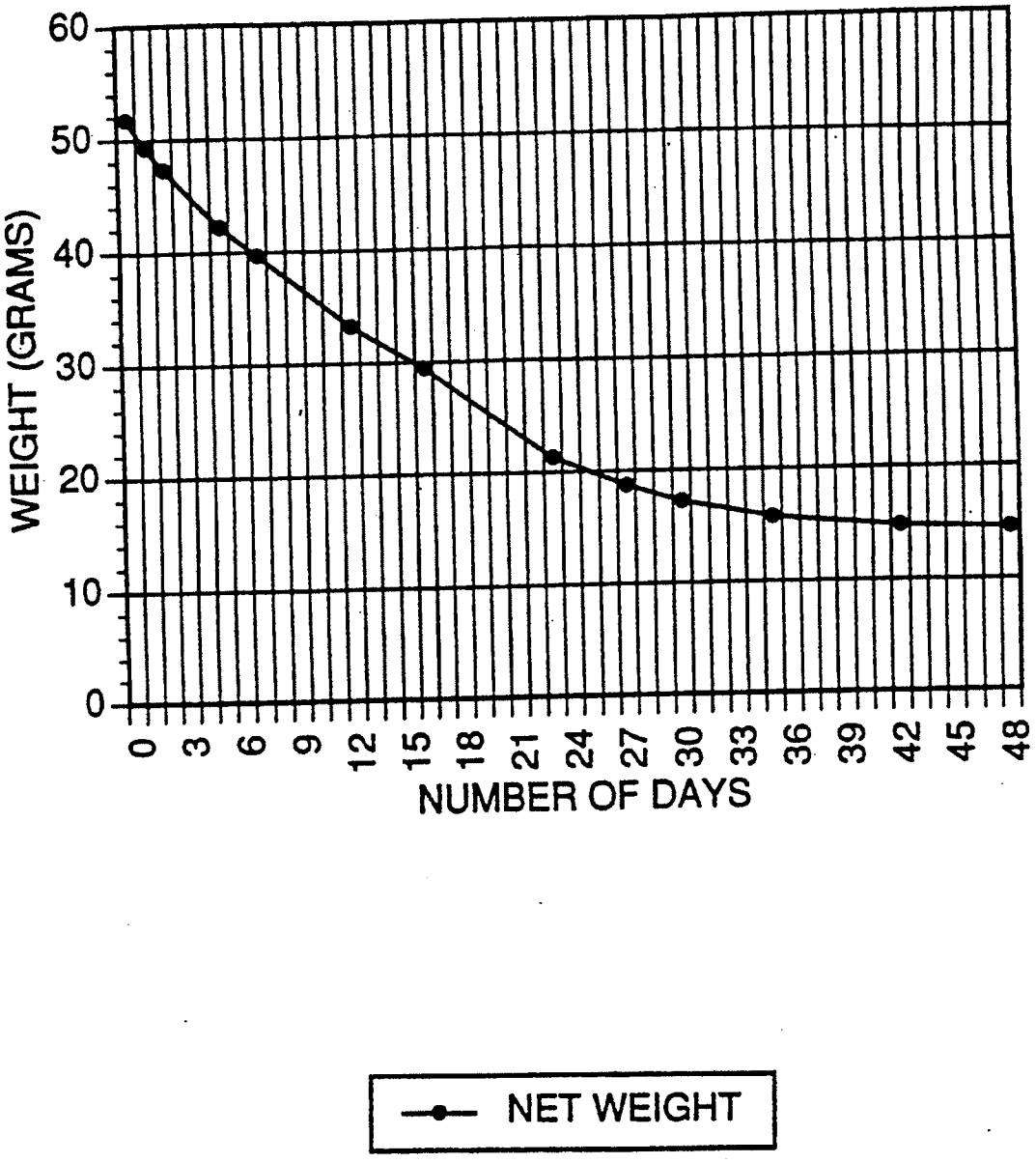


FIG.10

GARDENIA UNIGEL

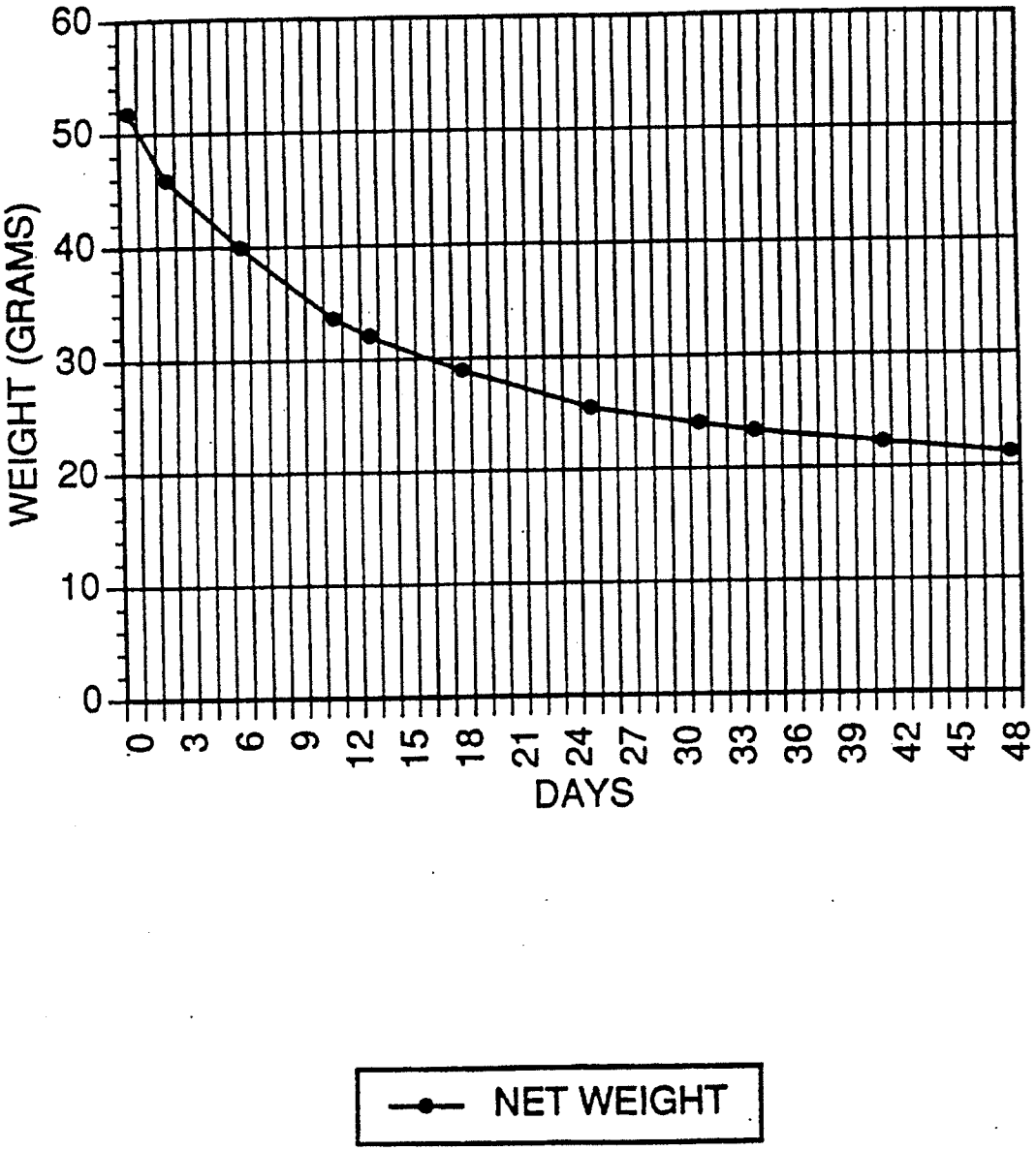


FIG.11

CHERRY UNIGEL PLUS

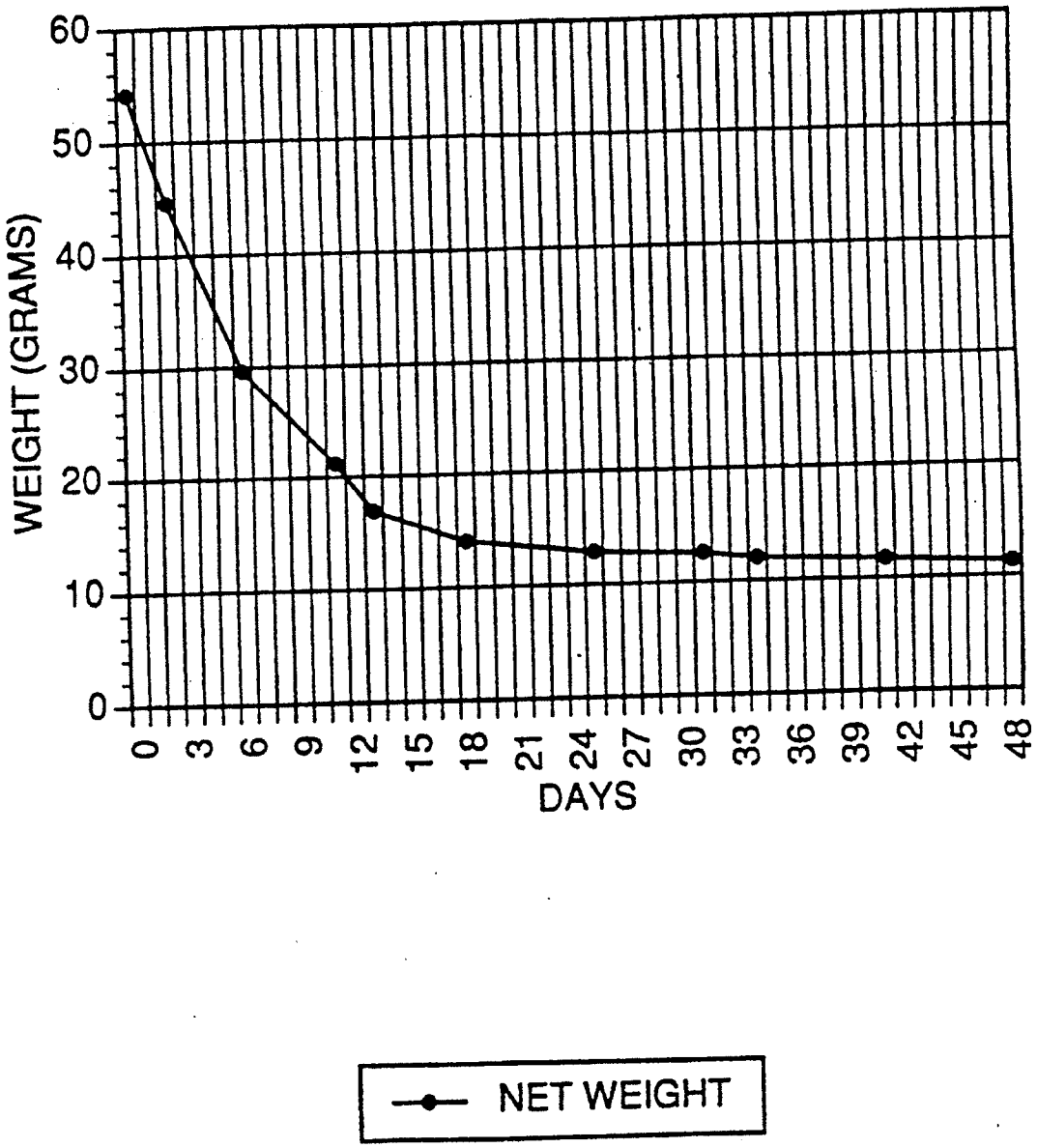
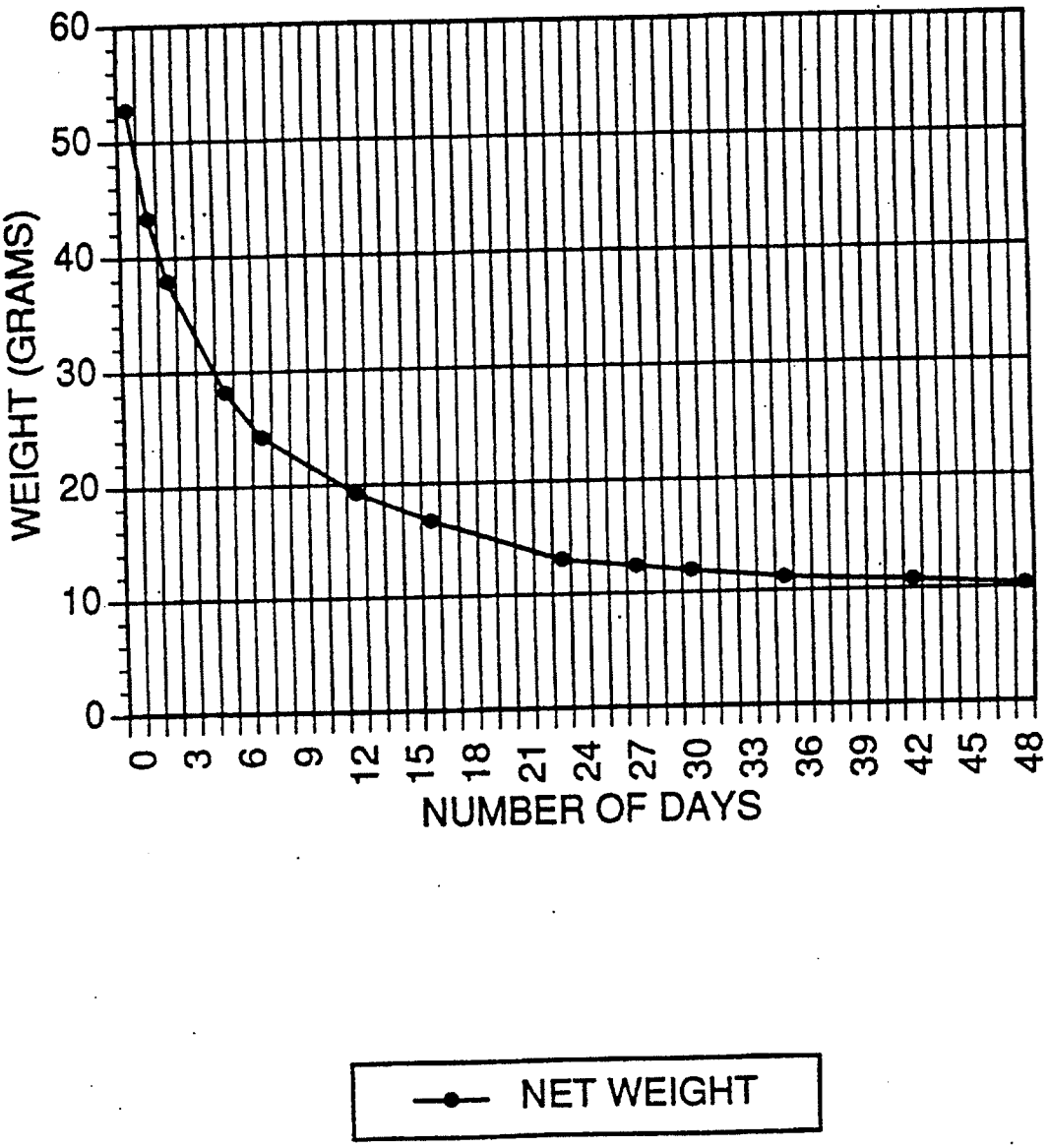


FIG. 12

BUBBLE GUM UNIGEL



DEODORANT CONTAINER AND PERFUMED STABLE GEL ASSEMBLY AND METHOD OF MANUFACTURE

DESCRIPTION

1. Technical Field

The present invention relates to a perfumed stable gel and to a deodorant container which retains a deodorant in the form of that perfumed stable gel, and which is adapted for use with various deodorant dispensers. The present invention also relates to a method of manufacture for the perfumed stable gel and the deodorant container in a unitary form. Specifically, the invention relates to a disposable deodorant container which retains a perfumed stable gel comprised of a unique combination of chemical components. The stable gel can be maintained at temperatures of up to 140° F. and preferably has a perfume content of up to 75%.

2. Background Prior Art

Deodorant containers holding an evaporative perfumed gel type deodorant for freshening the air of restrooms of commercial establishments are well known in the field of deodorizing and air freshening agents. The controlled dispensing of fragrance and the capacity to create an odor impression in a substantially closed space are concerns which are continually addressed in the field of deodorizing and air freshening agents. The importance of a controlled release or evaporation rate is important in determining the amount of fragrance to be used in the air freshening agent and in determining the functional life of the unit itself.

Solid compositions in which a fragrance or perfume is added to gelling agents offer a desirable and relatively low cost commercial delivery method for continuous action fragrance release devices. A method and apparatus for dispensing volatile components of an air treating gel is disclosed in U.S. Pat. No. 5,060,858 to Santini. In addition, a composite gel-foam air freshener is disclosed in U.S. Pat. No. 5,034,222 to Kellett et al.

Prior art patents relating to perfumed gel compositions include U.S. Pat. No. 4,755,377 to Steer for a foamed air freshener composition, U.S. Pat. No. 4,137,196 to Sakuri et al. for a gelatinuous fragrance-imparting composition containing stabilized perfume, and U.S. Pat. No. 4,067,824 to Teng et al. for a gelled perfume formulation.

Disadvantages of known gel-based air fresheners include rapid evaporation rates of the gel compositions, temperature instability, and inefficiency of perfume release wherein the perfume components are not released into the air but become entrapped in the gel residue. Disadvantages such as lack of temperature and heat stability can result in product evaporation, deterioration of product appearance, and loss of deodorizing effectiveness. Therefore, a need exists for a perfumed gel deodorizer which is long-lasting, stable at high temperatures, and able to sustain an effective release rate of the perfumed stable gel in both normal and adverse conditions.

In addition, the containers used to retain and dispense the perfumed gel compositions are known in the prior art. An open topped container having a perforated decorative cover and used for the dispensation of volatile components of a gel is disclosed in U.S. Pat. No. 5,060,858 to Santini. Other containers typically used to retain deodorizing agents include aluminum cups having an aluminum lid with a pull-back tab and open top containers covered by a layer of porous material.

The present invention is an improvement over the prior art in that none of the prior art inventions disclose a deodorant dispenser containing a chemical composition in the form of a perfumed stable gel, wherein the perfumed stable gel can be maintained at high temperatures and has a perfume content of up to 75%. In addition, none of the prior art inventions disclose a container having a base with a top surface and a bottom surface and having intersecting diametrical grooves on the bottom surface and four equi-angularly spaced support ribs or fins on the top surface which extend radially inwardly from the peripheral wall.

Previously, it was difficult to manufacture a product that could be maintained as a stable gel when exposed to temperatures of up to 140° F. when that product also included a perfume content of up to 75%. Obtaining a stable gel with up to a 75% perfume content has also been difficult to develop from a solubility perspective, as most other gels will liquefy, even at room temperatures, at levels of 50% perfume content. Up until now, there was no known perfumed stable gel with a melting point above 130° F. and having a perfume content of up to 75%. Thus, the need persisted for an easily manufactured, durable deodorant container holding a long-lasting and effective perfumed stable gel having a perfume content of up to 75% and maintaining its stability at high temperatures without undue evaporation.

In addition, because the gel has a high perfume content, it is a characteristic of the gel for its perfume components to evaporate over time. Thus, the perfumed stable gel is typically provided in a replaceable container so that it can be easily replaced when it has evaporated. The deodorant containers are typically shaped into a unique form corresponding to the shape of their respective dispensers. This greatly limits the interchangability of such replacement containers. Thus, it is desired to provide a gel container that can be adapted to and that can be placed into a broad range of dispensers. The dispensers that are used with the deodorant containers of the present invention may include a means for drawing air across the perfumed stable gel, for example, in the form of battery operated fan dispenser units. The dispensers may also be in the form of stand alone units. Typically, the deodorant containers filled with the perfumed stable gels can be used in conjunction with dispensers manufactured by the following: (1) F-Matic, (2) Impact, (3) Georgia Pacific,. and (4) Technical Concepts. However, the container retaining the perfumed stable gel composition of the present invention is not limited to use with the aforementioned dispensers.

It is also a characteristic of air freshening gels to shrink and harden as the perfume components of the gels evaporate. As the gel shrinks, the surface area is reduced, and the rate of perfume escape is decreased. Thus, it is desired to provide a deodorant container which limits or decreases gel shrinkage and hardening.

Finally, when the deodorant container and gel are shipped, they are subjected to shaking and otherwise generally rough handling. It is desired to provide a deodorant container which securely supports the gel during shipping and which is tough and rigid in structure.

SUMMARY OF THE INVENTION

The present invention relates to a disposable deodorant container retaining a perfumed stable gel and a

method of manufacture of the perfumed stable gel and deodorant container in unitary form. The perfumed stable gel is comprised of a unique combination of chemical components and is retained in and dispensable from a disposable container assembly which is adapted for use with various deodorant dispensers.

In a principal embodiment, the deodorant container itself comprises a shell structure, preferably cylindrical in shape and having a peripheral wall, a base and an open top. The base includes a top surface and a bottom surface. The base further includes a pair of intersecting diametrical grooves on the bottom surface and four equi-angularly spaced support ribs on the top surface which extend radially inwardly from the peripheral wall. Each of the ribs terminate with a perpendicular end portion closest to the center of the deodorant container. The intersecting diametrical grooves form corresponding intersecting diametrical ridges on the top surface of the base, and the ribs extend upwardly from the ridges. The peripheral wall terminates with a radially outwardly extending lip.

The disposable deodorant container retains a perfumed stable gel which is comprised of a unique combination of chemical components. The perfumed stable gel can be maintained as a gel when exposed to temperatures of up to 140° F. and has a perfume content of up to 75%. The perfumed stable gel comprises the following components: a nonylphenol, a soap, an odorless glycol, perfume, water, a dye, a preservative and an optional filler material. The deodorant container and improved perfumed stable gel composition are simply and economically manufactured in a unitary assembly by pouring the perfumed stable gel chemical composition while in a fluid state into the protective shell of the deodorant container and allowing the perfumed gel to set. The container is then heat-sealed with a foil top covering. The foil top covering may be removed from the deodorant container when the deodorant container is placed in a dispenser for use in deodorizing a room or area.

The deodorant containers can be utilized with various dispensers and particularly with those dispensers installed in restrooms of commercial establishments. Such dispensers used in conjunction-with the deodorant container of the present invention may include a means for drawing air across the perfumed stable gel, for example, in the form of battery operated fan dispenser units. The dispensers used in conjunction with the deodorant container of the present invention may also be in the form of stand alone units. Typically, the deodorant containers filled with the perfumed stable gels can be used in conjunction with dispensers manufactured by the following: (1) F-Matic, (2) Impact, (3) Georgia Pacific, and (4) Technical Concepts. However, the container retaining the perfumed stable gel composition of the present invention is not limited to use with these dispensers.

One aspect of the present invention is to provide a disposable deodorant container adapted for supporting an air freshening deodorant in the form of a perfumed stable gel and adapted for placement in a dispenser., i.e., a battery operated fan dispenser unit, a stand alone unit, etc.

Another aspect of the present invention is to provide a disposable deodorant container which retains an improved perfumed stable gel composition that can be maintained as a gel when exposed to temperatures of up to 140° F. and that has a perfume content of up to a 75%.

Another aspect of the present invention is to provide a disposable deodorant container which retains an improved perfumed stable gel which has both a long and uniform shelf life, and a long use or block life, while still maintaining an effective perfume content to deodorize over the life of the product.

Another aspect of the present invention is to provide a deodorant container having a simple design, compact size, considerable durability, and extensive adaptability to various deodorant dispensers.

Another aspect of the present invention is to provide a simple, economical process of manufacturing in unitary form a disposable deodorant container retaining an improved perfumed stable gel.

Other features and advantages of the invention will be apparent as set, forth below and taken in conjunction with the following drawings.

BRIEF DESCRIPTION OF DRAWINGS

In the detailed description which follows, reference will be made to the following FIGURES, in which:

FIG. 1 shows a prior art container used to hold deodorant gels and the like;

FIG. 2 is a perspective view of the deodorant gel container of the present invention used with a typical stand alone dispenser unit;

FIG. 3 is a perspective view of the deodorant gel container of the present invention used with a typical battery operated fan dispenser unit;

FIG. 4 is a top view of the deodorant container of the present invention;

FIG. 5 is a bottom view of the deodorant container of the present invention;

FIG. 6 is a side view of the deodorant container of the present invention;

FIG. 7 is a cross-sectional view of the deodorant container of the present invention taken along line 7—7 of FIG. 4; and,

FIGS. 8–12 show the test results for the rates of evaporation for various perfumed stable gels of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

This invention is susceptible to embodiments in many different forms. The drawings show and the specification describes in detail a preferred embodiment of the invention. It is to be understood that the present disclosure is to be considered as an exemplification of the principles of the invention. It is not intended to limit the broad aspects of the invention to the illustrated embodiment.

FIG. 1 shows a typical prior art container 1 used to hold deodorant gel or the like.

FIG. 2 shows a deodorant container 10 of the present invention adapted for supporting an evaporative deodorant gel 12 in the form of a perfumed stable gel and adapted for placement in a typical stand alone dispenser unit 20. The container 10 is formed from a high density polyethylene. The stand alone dispenser unit 20 is typically placed on a table top, shelf or other substantially flat surface and comprises a lid portion 22 and a base portion 24. The lid portion 22 is adapted to fit easily and securely onto and over the base portion 24. The container 10 is adapted to fit onto the inner surface 26 of the base portion 24. Once the container 10 is securely

placed onto the inner surface 26, the lid portion 22 is placed over the container 10 so as to conceal the container 10 from view. The lid portion 22 has lid vents 28 and the base portion 24 has base vents 30 so that the deodorant gel 12 can penetrate the air outside of the dispenser 20 while at the same time being concealed from view.

FIG. 3 shows the deodorant container 10 of the present invention adapted for supporting an evaporative deodorant gel 12 in the form of a perfumed stable gel and adapted for placement in a typical battery operated fan dispenser unit 40. The battery operated fan dispenser unit 40 is typically mounted on the wall of a room to be deodorized, i.e., a restroom. The fan dispenser unit 40 comprises a front cover portion 42 and a back portion 44. The back portion 44 has an attachment portion 46 which may have an adhesive on it for mounting the fan dispenser unit 40 to a wall or surface. The cover portion 42 is adapted to fit easily and securely against and over the back portion 44. The container 10 is adapted to fit into a holder portion 48 connected to an inner side 50 of the back portion 44. Once the container 10 is securely placed into the holder portion 48, the cover portion 42 is placed over the container 10 so as to conceal the container 10 from view. The fan dispenser unit 40 is typically powered by an energy source, such as a battery. When the fan dispenser unit 40 is turned on, the fan portion 52 located above the holder portion 48 acts to increase the rate at which the deodorant gel 12 is released into the air. As the deodorant gel 12 evaporates, the deodorant scent is released into the air of the room through cover vents 54.

FIG. 4 is a top view of the container 10 of the present invention. The container 10 comprises a generally cylindrical shaped shell 60 having a peripheral wall 62 (FIG. 6) and a base 64. The peripheral wall 62 has an inner side 66 and an outer side 68, and the peripheral wall 62 is about 3 cm (centimeters) in height. The base 64 has top surface 70 and a bottom surface 72, and the base 64 is about 6 cm in diameter. The peripheral wall 62 terminates with a radially outwardly extending lip 74, which supports the container 10 in a dispenser, i.e., on the holder portion 48 of fan dispenser unit 40 (FIG. 3).

On the top surface 70 of base 64 are a pair of intersecting diametrical ridges 76. Four equi-angularly spaced support ribs 78 or fins extend upwardly from the ridges 76 and extend radially inwardly from the inner side 66 of peripheral wall 62. Each of the ribs 78 or fins terminates with a perpendicular end portion 80 toward the center of the container 10, and each of the four ribs 78 is spaced 90 degrees apart. The ribs 78 and the end portions 80 terminate about 0.2 cm below the lip 74. The ends of the ribs 78 closest to the inner side 66 of the peripheral wall 62 are not connected to the inner side 66 of the peripheral wall 62 but are spaced about 2 cm from the inner side 66 of the peripheral wall 62. Thus, a space 82 is formed between the inner side 66 of peripheral wall 62 and one end of rib 78.

Deodorant gels tend to shrink and harden as they evaporate. The ribs 78 and respective end portions 80 advantageously operate to reduce the rate of such shrinkage and hardening of the gel because the configuration of the ribs 78 and respective end portions 80 allows the perfumed stable gel 12 to spread uniformly throughout the container 10 when it is poured into the container and provides a greater surface area for the gel to spread over. A greater surface area allows for a more steady and uniform rate of evaporation of the gel and less collapse of the gel matrix. In contrast, when there is a reduction in the surface area over which the gel can spread, there is a greater reduction in the rate of fragrance release. In addition, when there is a greater surface area for liquid gel to spread over, the liquid gel crystals can solidify over a greater area and evenly cool and solidify at a faster rate.

In certain applications, such as on the inside surface of a cover for a diaper hamper, the container 10 is placed upside-down in a typical dispenser unit and with the air-exposed side of the gel facing downward. In these applications, the ribs 78 and respective end portions 80 advantageously operate to keep the deodorant gel 12 from falling downwardly out of the container 10.

FIG. 5 shows a bottom view of the container 10 of the present invention. The intersecting diametrical ridges 76 form corresponding intersecting diametrical grooves 84 on the bottom surface 72 of the base 64. The ribs 78 are aligned above the grooves 84. The grooves 84 intersect at 90 degree right angles at a circular portion forming a cavity 86. The grooves 84 are about 0.7 cm wide. The circular void 86 is about 2 cm in diameter. These dimensions have been found to permit the container 10 to fit into most commercially available dispensers.

FIG. 6 shows a side view of the container 10 with its generally cylindrical shell 60 and radially outwardly extending lip 74. The groove 84 is formed upwardly from the bottom surface 72 of the base 64 and is continuous with the outer side 68 of the peripheral wall 62.

FIG. 7 is a cross-sectional view of the container 10 of the present invention taken along the line 7—7 of FIG. 4. Ribs 78 and respective end portions 80 are shaded.

When the deodorant gel 12 is originally packaged in the container 10, the gel 12 is covered with a protective heat-seal, such as foil, to prevent undesired evaporation. The foil may be removed when the container 10 is placed for use in typical dispenser units 20, 40.

In manufacturing the disposable deodorant container 10 of the present invention, injection molds are used in forming the containers. The first step involved in the manufacture of these plastic containers is the heating of the plastic to its melting point. The typical plastics used to form the containers of this invention include both high and low density polyethylenes. Once the plastic is melted, it is transferred through a barrel to be pressed. The plastic is then transferred into an injection mold to form the container, and once the container is formed, it is released from the mold. There is cool water circulating throughout the molds which acts to cool the plastic containers as they are formed. Approximately three to four containers can be made per minute with this process of manufacture. However, the cycle time for container formation varies depending on the type of plastic used.

The disposable deodorant container retains a perfumed stable gel comprised of a unique combination of chemical components. The perfumed stable gel can be maintained at temperatures of up to 140° F. and has a perfume content of up to 75%. Previously, it was difficult to manufacture a product that could be maintained as a stable gel when exposed to temperatures of up to 140° F. at a level of up to 75% perfume. Obtaining a stable gel with up to 75% perfume has also been difficult to develop from a solubility perspective as most other gels will liquefy, even at room temperatures, at levels of 50% perfume content. No one, to the inventors' knowledge, has been able to produce a stable gel

with a melting point above 130° F. and having a perfume content of up to 75%.

All percentages of ingredients or phases given herein are weight percentages of the entire perfumed stable gel composition, unless otherwise indicated.

A typical perfumed stable gel composition may include water in an amount of from about 2.0% to about 10.0% by weight of the composition. Preferably, the water is at its boiling point when initially mixed with the odorless glycol, and preferably the water is an amount of about 5.0% by weight of the composition.

The perfumed stable gel composition may also include a soap in an amount of from about 5.0% to about 15.0% by weight of the composition. Preferably, the soap is sodium stearate which has a melting point of 158° F., or another soap with an equal or higher melting point. Preferably, the soap is in an amount of about 7.5% by weight of the composition in the formulations for the cherry, jasmine, baby powder, and spice deodorant gels. Preferably, the soap is in an amount of about 9.0% by weight of the composition in the formulations for the green apple, lemon, bubble gum, spearmint, and gardenia deodorant gels. The increased amount of soap in these latter formulations increases the melting point and aids in solubilizing the perfumes.

The perfumed stable gel composition may also include a non-ionic surfactant. Preferably, the non-ionic surfactant contains a sufficient amount of ethylene oxide to provide a melting point temperature in the range of from about 100° F. to about 150° F. The non-ionic surfactant is preferably in an amount of from about 2.0% to about 15.0% by weight of the composition. Preferably, the non-ionic surfactant is in an amount of about 3.7% by weight of the composition. The preferred non-ionic surfactants to use include nonylphenol (Nonoxynol 100, with 100 mols of ethylene oxide in the product or Iconol NP-100) and/or polyethylene glycol 8000 (BASF's Pluracol line). Other non-ionic surfactants that can be used include nonylphenols of 80 mols up to 150 mols and/or other non-ionics similar to BASF's Tetronic and Tetronic R line. However, this latter group of non-ionic surfactants is currently more expensive to use than the former group.

The perfumed stable gel composition may also include a preservative in an amount of from about 0.1% to about 0.3% by weight of the composition. Preferably, the preservative used is Glydant (chemically known as DMDM Hydantoin (55% solution)($C_7H_{12}N_2O_4$)—Chemical Abstract No. is 6440—58—0). Preferably, the preservative is in an amount of about 0.25% by weight of the composition.

The perfumed stable gel composition may also include a perfume in an amount of from about 50.0% to about 87.0% by weight of the composition. The preferred amount of perfume is about 75.0% by weight of the composition. The perfume agent enhances the odor characteristics of the product. Specific examples of suitable perfume agents include lemon, bubble gum, cherry, spearmint, green apple, baby powder, gardenia, jasmine, herbal, spice, and others. The primary scents used are obtained from the fruity and floral scent groups. However, it is possible to produce any number of different scents depending on the type of scent desired.

The perfumed stable gel composition may also include an odorless glycol. The amount of odorless glycol employed in the chemical composition should be sufficient to aid in solubilizing the perfume component. Preferably, the amount of odorless glycol used is in an amount of from about 0% to about 12.0% by weight of the composition. The preferred amount to use is about 8.8% by weight of the composition. The preferred odorless glycols include propylene glycol and hexylene glycol. However, the improved perfumed stable gel composition may also be made without the odorless glycol.

The perfumed stable gel composition may also include a color dye which acts to enhance the physical appearance of the product and color code the product. Generic dyes which are heat stable are preferred.

The perfumed stable gel composition may also include inert or filler materials. These inert materials may be selected from the group including diatemaceous earth, clay, dirt, and sand. The addition of these inert materials to the composition is optional. However, the inert materials help to control the evaporation rate of the perfume component.

One may also include in some of the perfumes of the perfumed stable gel composition, ethanol or odorless mineral spirits. The ethanol and odorless mineral spirits aid in solubilizing some of the perfumes and/or in lowering the costs of manufacturing some of the more expensive perfumes (i.e., green apple) without affecting the performance of the gels. The mineral spirits may be comprised of alipbatic hydrocarbons.

The manufacture of the perfumed stable gel involves the mixing of: (1) an oil phase and (2) a water phase. The oil phase includes the non-ionic surfactant and the desired perfume. First, the non-ionic surfactant is heated to a temperature in the range of from about 120° F. to about 150° F. It is heated in a 55 gallon jacketed stainless steel mixing vessel. Heating bands surrounding the mixing vessel act to heat and liquefy the non-ionic surfactant. The non-ionic surfactant is heated in this manner for about 24 to 48 hours, depending on the size of the batch and the heating temperatures used.

After the non-ionic surfactant has been sufficiently heated and liquefied, it is transferred to a smaller open-top 55 gallon jacketed stainless steel mixing vessel. This mixing vessel also has heating bands surrounding it which act to heat the non-ionic surfactant and the perfume, which is added at this step in a pre-measured amount. The two components are thoroughly mixed in the mixing vessel with an electric mixer that has an attached agitator working at approximately 750 rpm. The perfume is mixed with the non-ionic surfactant for approximately 10 minutes at a temperature in the range of about 120° F. to about 150° F.

The second phase involved in forming the perfumed stable gel is the water phase. To manufacture the water phase, a pre-measured amount of the odorless glycol is added to boiling hot water. The glycol and water are mixed together in an open-top 55 gallon jacketed stainless steel mixing vessel. The two components are thoroughly mixed in the mixing vessel with an electric mixer that has an attached agitator working at approximately 750 rpm. The odorless glycol is mixed into the hot water for approximately 5 minutes at a temperature of about 158° F. Next, the soap is added in a pre-measured amount to the glycol/water mixture. The soap is thoroughly mixed into the glycol/water mixture in the mixing vessel until the soap is dissolved and there are no clumps remaining. The soap is mixed with the odorless glycol and water for approximately 15 minutes to 30 minutes at a temperature of about 158° F.

Next, the mixture of the water, the odorless glycol, and soap, i.e., the water phase, is added to the non-ionic surfactant and perfume, i.e., the oil phase. All of these components are thoroughly blended at a temperature of over 140° F. in the mixing vessel with an electric mixer that has an attached agitator working at approximately 750 rpm The preservative is added at this stage of the mixing. The dye can be added to the mixture at this stage or it can be added previously in the water phase mixture. All of these components are then thoroughly mixed for approximately 15 minutes.

Finally, an optional filler material can be added to the mixture by spooning with a ladle, a desired amount of the filler material into the mixture. The mixture is stirred thoroughly until the desired consistency is reached.

Once it is determined that the composition is thoroughly blended and while it is still in the molten state, the composition is spooned with a ladle out of the mixing vessel and into the individual deodorant containers.

Lastly, the containers holding the composition are cooled by placing the dispensers on a conveyor belt and blowing cold air upon those dispensers. The cold air is passed through a tunnel fed by an air conditioning unit. During the containers' 3 to 5 minutes in the tunnel, the gel composition solidifies in the dispenser assembly, thus securing the completed perfumed stable gel in the disposable deodorant container. The amount of composition prepared at one time is limited to the amount that is to be filled in the dispensers on a particular day. Typically, this amount can vary between 200 pounds to 400 pounds per day.

She following Example 1 illustrates the preparation of a preferred perfumed stable gel composition. Test results for the rates of evaporation of various perfumed stable gels are shown in FIGS. 8-12 and the corresponding recorded weights of the various gels during the evaporation period are shown in Tables 1-5. Also, formulations for various perfumed stable gel compositions are shown in Table 6.

EXAMPLE I

A preferred perfumed stable gel of the present invention was prepared as described below, having a cherry perfume and having the composition shown below.

COMPONENT	PERCENT BY WEIGHT OF COMPOSITION
Water	5.00%
Propylene Glycol	8.75%
Sodium Stearate	7.50%
Perfume	74.75%
ICONOL NP 100	3.75%
Glydant	0.25%
Dye	Trace
Inert Ingredients	Optional

The amount of composition prepared at one time is limited to the amount that is to be filled in the deodorant containers on a particular day. In the manufacture of the perfumed stable gel retained in the disposable dispenser, there are two distinct phases involved: (1) the oil phase and (2) the water phase.

The oil phase involves mixing the non-ionic surfactant with the desired perfume. First, the Iconol NP 100 is heated to a temperature in the range of from about 120° F. to about 150° F. The Iconol is heated in a 55 gallon jacketed stainless steel mixing vessel with surrounding heating bands that act to heat and liquefy the Iconol. The Iconol is heated in this manner for about 24 to about 48 hours, depending on the size of the batch and the heating temperatures used.

After the Iconol has been sufficiently heated and liquefied, it is transferred to an open-top 55 gallon jacketed stainless steel mixing vessel. This mixing vessel also has heating bands surrounding it which act to heat the non-ionic surfactant and the perfume, which is added at this step in a pre-measured amount. The two components are thoroughly mixed in the mixing vessel with an electric mixer having an attached agitator working at approximately 750 rpm. The perfume is mixed with the Iconol for approximately 10 minutes at a temperature in the range of about 120° F. to about 150° F.

The second phase in the formation of the perfumed stable gel is the water phase. In this phase a pre-measured amount of the propylene glycol is added to boiling hot water and mixed together in an open-top 55 gallon jacketed stainless steel mixing vessel. The propylene glycol and water are thoroughly mixed in the mixing vessel with an electric mixer that has an attached agitator working at approximately 750 rpm. The propylene glycol is mixed with the hot water for approximately 5 minutes at a temperature of about 158° F. Next, the sodium stearate soap is added in a pre-measured amount to the propylene glycol/water mixture. The sodium stearate is thoroughly mixed with the propylene glycol and water in the mixing vessel until the sodium stearate is dissolved and there are no clumps. The sodium stearate is mixed with the propylene glycol and water for approximately 15 to 30 minutes at a temperature of about 158° F.

Next, the mixture of water, propylene glycol, and sodium stearate, i.e., the water phase, is added to the mixture of Iconol and perfume, i.e., the oil phase. The components from the oil phase and the water phase are thoroughly blended at a temperature of over 140° F. in the mixing vessel with an electric mixer that has an attached agitator working at approximately 750 rpm. The preservative is added at this stage of mixing. The dye can be added to the mixture at this stage or it may have been previously added to the water phase mixture. These components are then thoroughly mixed for approximately 15 minutes.

Finally, the optional filler material can be added to the mixture. This is done by spooning with a ladle, a desired amount of the filler material into the mixture. The mixture is then thoroughly stirred until the desired consistency is reached.

When the composition has been thoroughly blended, and while still in the molten state, the composition is spooned with a ladle out of the mixing vessel and into the individual deodorant containers.

Lastly, the containers holding the composition are cooled by placing the dispensers on a conveyor belt and blowing cold air upon those dispensers. The cold air is passed through a tunnel fed by an air conditioning unit. The containers are placed on a conveyor belt and cooled in the tunnel for about 3 to 5 minutes, and the gel composition solidifies in the dispenser assembly, thus securing the completed perfumed stable gel in the disposable deodorant container. The amount of composition prepared at one time is limited to the amount that is to be filled in the dispensers on a particular day. Typically, this amount can vary between 200 pounds to 400 pounds per day.

Tests were also conducted to determine the evaporation rates of various perfumed stable gels. The test results recording the rates of evaporation for various perfumed stable gels are shown in the accompanying FIGS. 8–12 (FIG. 8-Spearmint, FIG. 9-Jasmine, FIG. 10-Gardenia, FIG. 11-Cherry, FIG. 12-Bubble Gum). Corresponding with FIGS. 8–12 are Tables 1–5 which show the recorded weights of the various gels during the evaporation period. In conducting these tests, although samples of the perfumed stable gels were made in the lab in smaller amounts than usual and the components were mixed together in smaller mixing vessels and heated on hot plates, the other procedures used in making the gels were the same as those described above. After the gels were made, they were weighed, less the weight of the plastic deodorant containers. The gels were then placed in the plastic deodorant containers, and the containers were placed in battery operated fan units located in various offices, bathrooms and closets around the production building. All of the rooms were maintained at room temperature throughout the experiment. The fans were turned on at the start of the experiment and operated continuously for 24 hours per day throughout the testing period. In every day operation and normal use, fans would probably not be operated for a continuous 24 hour period and different types of battery operated fan units could be used with the deodorant gels. For example, sophisticated battery units are available that either have an infrared motion detector or a light sensitive eye that turns the machines on and off. These types of units cause the fan to operate for only a portion of the time as opposed to the continuous operation in the experiments conducted herein.

The weights of the gels were then recorded at various intervals as indicated by the black dots on the graphs. The average gel system evaporated at a rate sufficient to allow the product to last up to 45 days when used with a battery operated fan unit which was continuously running. Thus, the gels are capable of lasting for even a longer period of time with less exposure under a fan.

In addition, the formulations for various perfumed stable gel compositions that were prepared are shown in Table 6.

It will be understood that the invention may be embodied in other specific forms by one of ordinary skill in the art without departing from its spirit or central characteristics. The present example and embodiment is thus to be considered as illustrative and not restrictive, and the invention is not intended to be limited to the details of the listed embodiments. Rather, the invention is defined by the claims, and as broadly as the prior art will permit.

UNIGEL PLUS SPEARMINT

NUMBER OF DAYS	NET WEIGHT (GRAMS)
0	48.3
1	44.6
4	38.35
9	31.9
16	25.4
22	21.7
25	20.4
32	18.1
39	16.2
45	15.1

UNIGEL PLUS JASMINE

NUMBER OF DAYS	NET WEIGHT (GRAMS)
0	51.75
1	49.25
2	47.3
5	42.15
7	39.65
12	33.2
16	29.4
23	21.25
27	18.7
30	17.2
35	15.7
42	14.8
48	14.5

UNIGEL PLUS GARDENIA

NUMBER OF DAYS	NET WEIGHT (GRAMS)
0	51.8
2	45.9
6	39.9
11	33.6
13	32
18	28.9
25	25.5
31	24
34	23.3
41	22.2
48	21.2

UNIGEL PLUS CHERRY

NUMBER OF DAYS	NET WEIGHT (GRAMS)
0	54.15
2	44.6
6	29.6
11	21.1
13	16.85
13	16.85
13	16.85
18	14
25	12.8
25	12.8
31	12.5
41	11.7
48	11.3

UNIGEL BUBBLE GUM

NUMBER OF DAYS	NET WEIGHT (GRAMS)
0	52.75
1	43.35
2	37.9
5	28.2
7	24.2
12	19.2
16	16.6
23	13
27	12.35
30	11.9
35	11.15
42	10.8
48	10.3

TABLE 6

	GREEN APPLE	CHERRY	LEMON	JASMINE	BUBBLE GUM	SPEAR-MINT	BABY POWDER	SPICE	GARDENIA
WATER	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
PROPYLENE GLYCOL	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75
SODIUM STEARATE	9.00	7.50	9.00	7.50	9.00	9.00	7.50	7.50	9.00
PERFUME	73.25	74.75	73.25	74.75	73.25	73.25	74.75	74.75	73.25
GLYDANT*	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
ICONOL NP-100	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
DYE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE
TOTAL PERCENT	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

*GLYDANT IS THE PRESERVATIVE. CHEMICALLY IT IS DMDM HYDANTOIN (55% SOLUTION) [C7H12N2O4]

What is claimed is:

1. A container adapted for supporting a deodorant in the form of an improved perfumed stable gel and for placement in a dispenser, the container comprising:

a shell having a peripheral wall and a base, wherein said base has a top surface and a bottom surface, and further wherein said base includes a pair of intersecting grooves positioned along intersecting diameters of said bottom surface, said intersecting grooves forming a pair of corresponding intersecting ridges, said ridges extending upwardly from said top surface of said base; and

at least one support rib extending upwardly from one of said ridges, said support rib terminating with a perpendicular end portion toward the center of said container, and said support rib extending radially inwardly from said peripheral wall.

2. The container of claim 1 further comprising a plurality of support ribs, wherein each of said ribs extends radially inwardly from said peripheral wall.

3. The container of claim 2 wherein said ribs are spaced an equal distance from each adjacent said rib and said ribs are spaced from an inner side of said peripheral wall.

4. The container of claim 2 comprising four of said ribs wherein each of said ribs is spaced 90 degrees from adjacent said ribs.

5. The container of claim 4 wherein said ribs are aligned with said grooves.

6. The container of claim 1 wherein said grooves intersect at a right angle.

7. The container of claim 1 comprising four of said ribs spaced at 90 degrees, wherein each of said ribs extend upwardly from said ridges.

8. The container of claim 1 wherein said peripheral wall terminates with a radially outwardly extending lip, said lip adapted to support said container in said dispenser.

9. The container of claim 1 further comprising a circular portion forming a cavity at said intersection of said grooves.

10. The container of claim 1 wherein said shell is generally cylindrical.

11. The container of claim 1 wherein said improved perfumed stable gel composition comprises water, a soap, a non-ionic surfactant, and, a perfume in an amount of from about 50% to about 87% of said composition, said gel composition capable of being maintained as a stable gel at a temperature of at least 140 degrees F.

12. The improved perfumed stable gel composition of claim 11 further comprising an odorless glycol.

13. The improved perfumed stable gel composition of claim 12 wherein said odorless glycol is propylene glycol.

14. The improved perfumed stable gel composition of claim 13 wherein said odorless glycol is in an amount of from about 0% to about 12.0% by weight of said composition.

15. The improved perfumed stable gel composition of claim 11 further comprising a preservative.

16. The improved perfumed stable gel composition of claim 15 wherein said preservative is in an amount of from about 0.1% to about 0.3% by weight of said composition.

17. The improved perfumed stable gel composition of claim 11 further comprising a dye.

18. The improved perfumed stable gel composition of claim 11 further comprising an inert material.

19. The improved perfumed stable gel composition of claim 18 wherein said inert material is selected from the group consisting essentially of diatemaceous earth, clay, dirt and sand.

20. The improved perfumed stable gel composition of claim 11 wherein said water is in an amount of from about 2.0% to about 10% by weight of said composition.

21. The improved perfumed stable gel composition of claim 11 wherein said soap is sodium stearate.

22. The improved perfumed gel composition of claim 11 wherein said soap is in an amount of from about 5.0% to about 15.0% by weight of said composition.

23. The improved perfumed stable gel composition of claim 11 wherein said non-ion surfactant is selected from the group consisting essentially of nonylphenol and nonoxynol.

24. The improved perfumed stable gel composition of claim 11 wherein said non-ionic surfactant is in an amount of from about 2.0% to about 15.0% by weight of said composition.

25. The improved perfumed stable gel composition of claim 11 wherein said perfume is selected from the group consisting essentially of lemon, bubble gum, cherry, spearmint, jasmine, green apple, baby powder, spice and gardenia.

26. The improved perfumed stable gel composition of claim 11 wherein said perfume is in an amount of about 75%.

27. A container adapted for supporting a deodorant in the form of a gel and for placement in a dispenser, the container comprising:

a cylindrical shell having a peripheral wall and a base, wherein said base has a top surface and a bottom surface, and further wherein said base includes a pair of intersecting grooves positioned along intersecting diameters of said bottom surface; and

a plurality of equi-angularly spaced support ribs on said top surface and extending radially inwardly from said peripheral wall, wherein each of said ribs

terminates with a respective perpendicular end portion.

28. A system for deodorizing a restroom, or the like, the deodorizing system comprising:

a dispenser;

a container removably disposed within said dispenser and containing an evaporative deodorant gel, the container comprising a cylindrical shell having a peripheral wall and a base, wherein said base has a top surface and a bottom surface, and further wherein said base includes a pair of intersecting grooves positioned along intersecting diameters of said bottom surface, said intersecting grooves forming a pair of corresponding intersecting ridges, said ridges extending upwardly from said top surface of said base, and a plurality of equiangularly spaced support ribs extending upwardly from said ridges and extending radially inwardly from said peripheral wall, wherein each of said ribs terminates with a respective perpendicular end portion.

29. The system of claim 28 further comprising means for drawing air across said gel.

30. The container of claim 28 wherein said grooves intersect at a right angle.

31. The container of claim 28 comprising four of said ribs spaced at 90 degrees, wherein each of said ribs extends upwardly from said ridges.

32. The container of claim 28 wherein said peripheral wall terminates with a radially outwardly extending lip, said lip adapted to support said container in said dispenser.

33. The container of claim 28 further comprising a circular portion forming a cavity at said intersection of said grooves.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 5,324,490

DATED : June 28, 1994

INVENTOR(S) : Eftichios Van Vlahakis et al.

It is certified that error appears in the above-indentified patent and that said Letters Patent is hereby corrected as shown below:

Column 6, line 22, delete "void" and insert --portion forming a cavity--.

Column 8, line 27, delete "alipbatic" and insert —aliphatic—.

Column 9, line 33, delete "She" and insert --The--.

Signed and Sealed this

Twentieth Day of December, 1994

Attest:

BRUCE LEHMAN

Attesting Officer

Commissioner of Patents and Trademarks

US005372303A

United States Patent [19]

Paul

[11] Patent Number: 5,372,303

[45] Date of Patent: Dec. 13, 1994

"E"

[54] **AIR FRESHENER AND/OR DEODORIZER DISPENSING SYSTEM**

[76] Inventor: **Leonard Paul**, 13 Stuart Dr., Bloomfield, Conn. 06002

[21] Appl. No.: **163,338**

[22] Filed: **Dec. 6, 1993**

[51] **Int. Cl.**[5] **A61L 9/12**

[52] **U.S. Cl.** **239/56**; 239/58

[58] **Field of Search** 239/34, 44, 49, 51.5, 239/53, 55, 56, 58, 60

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,615,754	10/1952	Lindenberg	239/56
2,626,833	1/1953	Valentine	239/56
3,985,298	10/1976	Nichols	239/54
4,283,011	8/1981	Spector	239/36
4,517,308	5/1985	Ehlenz et al.	502/401
4,529,125	7/1985	Sullivan	239/56
4,634,614	1/1987	Holzner	428/35
4,696,844	9/1987	Spector	428/46
4,712,737	12/1987	Hecking	239/58
4,808,466	2/1989	Kotani et al.	428/254
4,814,212	3/1989	Spector	428/14
4,900,765	2/1990	Murabayashi et al.	523/122
4,923,119	5/1990	Yamamoto et al.	239/55
4,998,671	3/1991	Leifheit	239/56
5,046,604	9/1991	Forhetz et al.	206/0.5
5,071,704	12/1991	Fischel-Ghodsian	428/354
5,164,178	11/1992	Muysson	424/76.4

FOREIGN PATENT DOCUMENTS

1191863	4/1989	Japan	239/56
2161383	1/1986	United Kingdom	239/56

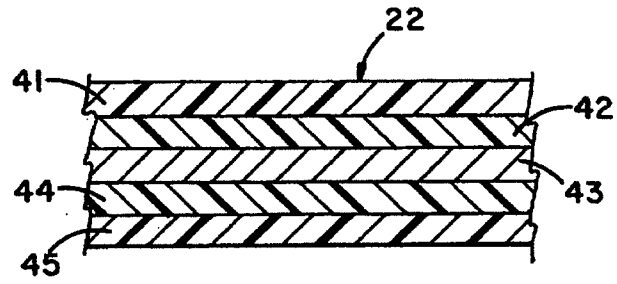
Primary Examiner—Karen B. Merritt

Attorney, Agent, or Firm—Melvin I. Stoltz

[57] **ABSTRACT**

By providing a unique fragrance composition which incorporates a fixative for controlling the rate of dispersion of the fragrance and associating the fragrance composition with a cotton-based wicking member which is securely sealed in a flexible container formed from a multi-layered sheet material, a unique and highly advantageous air freshener and/or deodorizer dispensing system is attained. In the preferred embodiment, the multi-layered flexible container is constructed for cooperating association with all conventional heating systems which enables the temperature of the fragrance composition to be raised, causing its dispersion throughout the desired area to be substantially enhanced. In addition, in the preferred embodiment, the dispensing system of this invention employs a small, compact and flexibly moldable container or housing which enables the dispensing system to be easily positioned in any desired location, regardless of the size constraints imposed thereon.

19 Claims, 1 Drawing Sheet



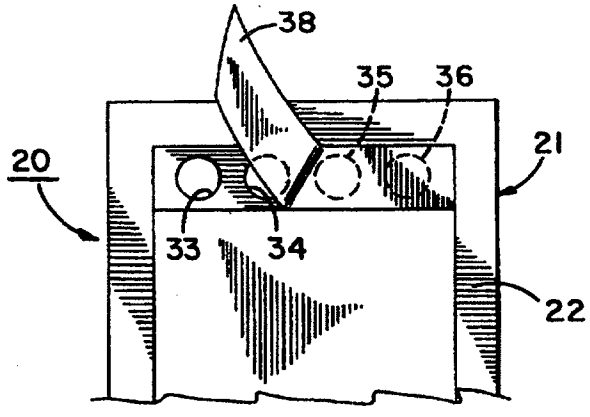
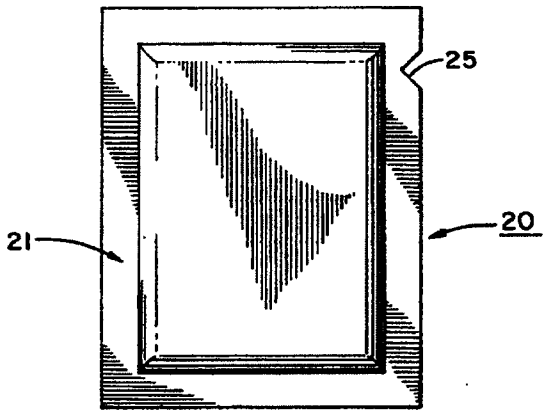


FIG. 1



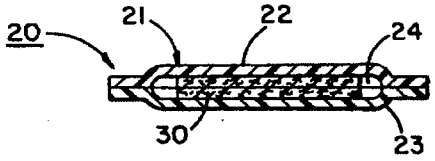


FIG. 2

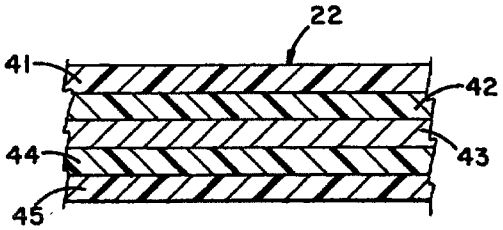


FIG. 3

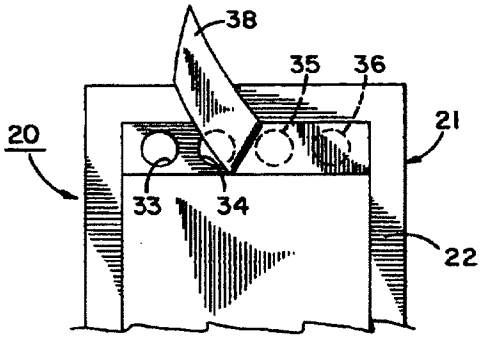


FIG. 4

AIR FRESHENER AND/OR DEODORIZER DISPENSING SYSTEM

TECHNICAL FIELD

This invention relates to air fresheners and/or deodorizers and, more particularly, to an integrated system for containing and dispensing the desired air freshening/deodorizing fragrance over extended time periods.

BACKGROUND ART

Air freshening or deodorizing has long been sought by consumers, in both residential and commercial environments. Due to the wide variety of odors which are generated, the desire to reduce or eliminate offensive odors has long existed along with the desire to provide a long-lasting pleasing odor.

In an attempt to meet the demand for air fresheners or deodorizers, numerous products have been developed and are presently available in the marketplace. In general, these prior art products are sold as solids, liquids, or aerosol sprays to provide the desired air freshening or deodorizing effect. Typically, these prior art products are used to eliminate, chemically change, or mask an existing odor. In addition, these products typically work by absorbing odorous molecules, dissolving or emulsifying such molecules, or killing bacteria that causes the offensive odor.

Although substantial effort has been expended in providing various delivery systems for establishing a pleasant odor in areas or environments in which offensive odors continuously exist, no fully satisfactory delivery system has been attained which is capable of providing long-term deodorizing or air freshening. In particular, such prior art systems as spray deodorants are capable of providing only temporary relief in freshening the air or eliminating the undesirable odors. Once the product has been sprayed into the air, the odor-changing spray quickly dissipates, providing only temporary or transitory relief. This limited benefit is particularly true in environments where heating or cooling is provided by forced air flow, since the air flow further increases air turbulence, causing the air freshening spray to dissipate more rapidly.

Similar short term beneficial effects are also attained with the liquid and solid air freshening products which are capable of only providing limited distribution of the deodorizer or air freshener and often become depleted of any beneficial effect over a short duration. Consequently, these products have only been capable of realizing limited acceptance and use.

Prior art systems typically range from simple dispensers containing the air freshening material to more complex, delivery systems constructed for decorative or designer effects. Unfortunately, such decorative effects cause such products to be substantially more expensive, with the ability of these products to deliver long-term continuous air freshening or deodorizing not being enhanced.

One prior art system employs a multi-layered flexible package for use in association with vacuum cleaners in order to provide air freshening or deodorizing during the vacuuming operation. However, these products are typically not capable of being employed in other environments and are unable to provide long-lasting, continuous, dependable air freshening or deodorizing due to the use of sponge material as the fragrance carrier. As a result, these prior art products lacked versatility and broad-based usability.

Another prior art system attempts to achieve greater fragrance distribution by using electricity to heat the dispenser. Although greater fragrance distribution is attained over solid, non-heated dispensers, these prior art systems are extremely expensive and provide only a very limited, moderate improvement.

Therefore, it is a principal object of the present invention to provide a fully integrated, air freshener and/or deodorizer dispensing system which provides a highly concentrated, readily dispersible air freshening/deodorizing composition which is capable of providing long-term, delivery of the desired fragrance.

Another object of the present invention is to provide an air freshener/deodorizer dispensing system having the characteristic features described above which provides a fully integrated, leak-free container system with a fragrance holding and dispersing system which assures continuous, complete and controlled dispersion of the fragrance only when desired by the user.

Another object of the present invention is to provide an air freshener/deodorizer dispensing system having the characteristic features described above which is capable of providing an easily employable, variable opening system for enabling the user to control the amount of fragrance being dispersed.

Another object of the present invention is to provide an air freshener/deodorizer dispensing system having the characteristic features described above which is capable of being easily positioned in a wide variety of locations, previously unattainable, due to the overall construction of the dispensing system of the present invention.

A further object of the present invention is to provide an air freshener/deodorizer dispensing system having the characteristic features described above which is capable of being easily employed in both residential and commercial establishments for providing long-term air freshening and/or deodorizing throughout the entire building or zone within which the system is employed.

Another object of the present invention is to provide an air freshener/deodorizer dispensing system having the characteristic features described above which is a easily employed in air conditioning and heating ducts or other heat delivering systems.

Another object of the present invention is to provide an air freshener/deodorizer dispensing system having the characteristic features described above which is safe for use with children as well as constructed in a dispensing system which virtually eliminates any possibility of unwanted use or contact by children.

Another object of the present invention is to provide an air freshener/deodorizer dispensing system having the characteristic features described above which is able to cooperate with all conventional heating and cooling systems to circulate the desired fragrance without requiring mounted engagement with electrical outlets.

Other and more specific objects will be in part be obvious and will in part appear hereinafter.

SUMMARY OF THE INVENTION

The present invention overcomes all of the difficulties and drawbacks of prior art systems by providing a unique air freshener and/or deodorizer dispensing system which comprises a highly concentrated, oil-based solution of the desired fragrance associated with a

highly or super absorbent wicking member which is contained in a small, compact, multi-layered flexible package. The multi-layered, flexible housing or container employed as part of the dispensing system of the present invention is completely flexible and moldable into virtually any desired configuration. In this way, the dispensing system is capable of being positioned in virtually any desired location, regardless of size constraints.

Another feature of the present invention is the attainment of an air freshener/deodorizer dispensing system which is completely sealed prior to actual use and is constructed with a housing or container which is virtually impervious to the air freshening/deodorizing composition incorporated therein. Consequently, prior to user-initiated, controlled opening of the dispensing system, the contents are maintained completely scaled within the container, incapable of being released until desired. As a result, each package of the dispensing system is capable of being stored for virtually any desired period of time with assurance that the product will possess all of the desired air freshening/deodorizing capabilities whenever the package is opened for use.

Another feature of the present invention is the construction of the air freshener/deodorizer dispensing system which enables the user to control the size of the portal or opening in the housing through which the fragrance passes. In this way, depending upon the amount of air freshening or deodorizing desired by the user, the housing or container can be opened minimally or completely in order to regulate the rate at which the fragrance is dispensed from the housing or container. In this way, any desired application can be easily accommodated.

In the preferred embodiment, the flexible housing or container is constructed with a notch zone formed in a sealed zone of the housing to enable the user to open the dispensing system by advancing the notch into the pouch area within which the fragrance and wicking means are contained. By controlling the area being opened, the desired dispensing portal can be quickly and easily achieved.

If desired, other constructions can be employed in order to control the size of the dispensing zone. One such alternate construction, which has been found to be highly effective, is the incorporation of a plurality of apertures formed along one edge of the interior pouch or holding zone, in association with an overlying, removable, sealing strip which seals the apertures, maintaining the air freshening/deodorizing composition completely potent until use is desired. Whenever needed, the user merely removes all, or a portion of the sealing strip, exposing the desired number of apertures needed for the particular application. In this way, an alternate construction for completely controlling the amount of fragrance being dispensed is attained.

In the preferred embodiment of the present invention, the wicking means comprises cotton material positioned in the holding zone or pouch in direct contact with the air freshening/deodorizing composition. Typically, the air freshening/deodorizing composition is fully absorbed throughout the wicking material, with any remaining supply of air freshening/deodorizing composition being pooled in one area of the holding zone with the wicking means in contact therewith. In this way, when the dispensing system is opened and a portion of the air freshening/deodorizing composition is expelled through the dispensing zone, the wicking material is continuously supplied with additional air freshening-/deodorizing composition until all of the material has been absorbed into the wicking material and dispensed.

The cotton wicking means may be constructed with the cotton material either in a woven form or in a bat form. Regardless of which configuration is employed, it has been found that by using cotton, a continuous supply of the air freshening/deodorizing composition is maintained and effective and efficient dispensing of the composition is realized. In this way, the dispensing system of the present invention achieves a continuous, trouble-free, reliable air freshening and/or deodorizing of the desired ambient area.

Another feature of the present invention is the attainment of a unique composition for the fragrance solution. In the present invention, a fixative is employed with the fragrance to control the rate of dispersion of the fragrance. In this way, a longer lasting air freshener/-deodorizer dispensing system is attained.

By employing this preferred construction, a dispensing system is realized which overcomes all of the prior art difficulties and provides a long-lasting, reliable air freshening and/or deodorizing delivery system. In particular, it has been found that the present invention is uniquely adapted for use in commercial as well as residential environments. In this regard, the present invention is applicable for being placed in air conditioning ducts in commercial installations for delivering air freshening and/or deodorizing to an entire building or wing to which air flow through a duct is being directed. Furthermore, due to the unique combination of elements attained by the present invention, this delivery system is able to be used in direct association with all types of heat delivering systems, as well as air conditioning and air flow systems.

In this regard, it has been found that the delivery system of the present invention is uniquely applicable to use in convalescent homes, hospitals, etc., where difficulty in delivering a continuous air freshening and/or deodorizing composition has existed. However, by merely placing of the present invention in an air conditioning duct or other air supply chamber, the desired air freshening and/or deodorizing fragrances are efficiently and effectively delivered throughout the desired building or zone.

It has also been found that by employing the unique wicking means, air freshening/deodorizing composition and multi-layered compact, flexible construction, the delivery system of the present invention can be easily positioned and effectively used in direct association with any conventional heating system in order to attain substantially improved fragrance dispersion. In addition, the dispensing system can be effectively positioned in otherwise inaccessible spaces or locations. These two assets are particularly employed by such locations as conventional heating systems such as hot water, electric, and hot air based systems.

Typically, a hot water based system employs radiators or hot water pipes which run along a wall directly adjacent a floor and wall. The hot water pipes are peripherally surrounded by a plurality of baffles or fins, with the fins covered by a metal housing. The heat from the hot water passes through the pipe to the radiator or fins and is conducted, by convection, through the radiator or housing to the room. By employing the present invention, the air freshening/deodorizing delivery system can be positioned in any desired location directly on or adjacent the radiator, the fins, or on the housing

therefor to enable the deodorizing and/or air freshening fragrances to be carried with the warm air into the room. Electric heat systems employ similarly constructed fin and housing systems with which the dispensing system of the present invention can be easily employed to obtain the same efficacious results.

Furthermore, heated air and convention currents are employed by wood stoves to heat rooms, with the wood stoves typically having baffle means. With the present invention, the delivery system can be placed near a wood stove or on the baffles associated with the stove to attain the desired result. Care need be exercised to avoid the placement of the delivery system on a hot surface whose temperature would adversely affect the dispensing system.

Finally, hot air systems use ducts, conduits, and registers for controlling the flow of the hot air to heat the room or zones. In employing the present invention, the delivery system can be placed in the duct or register through which the hot air flows in order to heat the dispenser system and drive the dispersion of the fragrance into the room or zone. As a result, a substantially improved fragrance delivery is obtained, without requiring complex, expensive assemblies, such as are needed with prior art systems which are heated by being plugged into household electricity.

By providing a dispensing system which is capable of being used effectively and efficiently with all heating systems, the efficacy of the present invention is substantially enhanced. As detailed herein, the fragrance composition comprises a fixer for controlling its rate of dispersion and the container or housing of the dispensing system incorporates a plurality of intimately bonded integrally affixed layers, one of which comprises a metallic foil layer. As a result of this construction, the delivery system of the present invention is able to employ the heat produced by conventional heating systems to raise the temperature of the metal foil of the container. With this elevated temperature directly effecting the supply of the air freshening/deodorizing composition, the volatility of the composition is enhanced and a more effective delivery of the composition to the environment is realized.

In the preferred embodiment, the flexible container of the present invention is formed from two separate and independent sheets, each sheet of which is identical to the other and comprises a plurality of layers integrally bonded together to form the continuous sheet. Preferably, five separate layers are integrally bonded together, at least one layer of which comprises a metal foil layer which is bonded on both surfaces thereof to a plurality of separate layers formed from one or more compounds selected from the group consisting of polyester films, low density polyethylene films, ethylene acrylic acid copolymer films, and linear low density polyethylene films.

By employing this construction, two separate and independent multi-layer composite sheets are peripherally sealed to each other, forming an interior holding zone or pouch within which the super absorbent, cotton-based wicking material is mounted along with the air freshening/deodorizing composition. Once the wicking material and air freshening/deodorizing composition are positioned in the interior holding zone, the holding zone is completely sealed, assuring secure, leak free retention of the air freshening/deodorizing composition in the multi-layered container.

By employing the multi-layered construction for each of the surfaces forming the sealed container, assurance is provided that the concentrated air freshener/deodorizing composition is incapable of permeating or diffusing through the wall of the container. This assures long-term storage of the air freshening/deodorizing dispensing system of the present invention. In this way, the present invention can be retained for as long as desired and, once opened, the user is assured that the concentrated air freshening/deodorizing composition contained therein has maintained its potency and is ready for providing the desired air freshening or deodorizing results.

The invention accordingly comprises the features of construction, combinations of elements and arrangements of parts which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

THE DRAWINGS

For a fuller understanding of the nature and objects of the present invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a front elevation view showing the air freshener/deodorizer dispensing system of the present invention;

FIG. 2 is a cross-sectional side elevation view of the air freshener/deodorizer dispensing system of the present invention;

FIG. 3 is a greatly enlarged, cross-sectional elevation view, partially broken away, depicting the preferred construction of the plurality of integrally bonded layers forming the side wall of the dispensing system of the present invention; and

FIG. 4 is a front elevation view, partially broken away, depicting an alternate embodiment of the air freshener/deodorizer dispensing system of the present invention.

DETAILED DESCRIPTION

In FIGS. 1 and 2, the preferred embodiment of the air freshener/deodorizer dispensing system 20 of the present invention is clearly depicted. As shown therein, air freshener/deodorizer dispensing system 20 comprises a small, compact, flexible housing or container 21 which is formed by securely affixing side walls or panels 22 and 23 to each other.

In the preferred embodiment, as fully detailed below, side walls or panels 22 and 23 each comprise a plurality of integrally bonded layers to form a high strength, non-permeable and completely flexible panel or side wall member. In order to form container or housing 21, side walls or panels 22 and 23 are placed in overlying contacting engagement with each other and intimately bonded together about their outer peripheral edges. In this way, a completely sealed, impervious container or housing 21 is formed which is sealed about all four sides thereof and incorporates an interior holding zone or pouch 24.

In the preferred construction, in order to attain access to interior holding zone or pouch 24 of container or housing 21, a notch or slit 25 is formed along one edge of container 21. In this regard, care must be exercised to prevent notch 25 from extending inwardly from the side edge so as to extend into holding zone or pouch 24. In this way, holding zone or pouch 24 is completely sealed from the ambient surrounding. However, any individ-

ual, wishing to open holding zone or pouch **24**, is capable of doing so, whenever desired, by merely applying a tearing force to notch **25**, causing notch **25** to extend into holding zone or pouch **24**. In this way, zone **24** is maintained completely sealed from the ambient surroundings until access to zone **24** is sought by the user.

In the preferred embodiment, prior to sealing side walls or panels **22** or **23** to each other to form container or housing **21**, super absorbent, cotton-based wicking material **30** is positioned within holding zone or pouch **24**. In addition, the air freshening/deodorizing composition is also placed in holding zone or pouch **24**, typically in fully absorbed, dispersed, cooperating interengagement with super absorbent cotton wicking means **30**. However, if wicking means **30** is fully absorbed with the air freshening/deodorizing composition and excess composition remains, the excess composition merely pools within holding zone **24**, remaining in direct contact with wicking means **30**. Consequently, whenever container or housing **21** is open, as detailed above, and the air freshening/deodorizing composition is dispensed, wicking means **30** is maintained fully saturated by absorbing the excess air freshening/deodorizing composition until all of the excess formulation has been fully absorbed and all of the absorbed composition has been completely dispensed.

As is apparent from FIGS. **1** and **2**, as well as the foregoing detailed disclosure, air freshening/deodorizing container and dispensing system **20** of the present invention may comprise any size or shape with interior, sealed holding zone **24** also comprising any desired size, shape or configuration. However, in order to employ the teaching of the present invention, cotton wicking means **30** must be mounted within holding zone **24** substantially filling the entire holding zone. In this way, complete absorption and distribution of all air freshening/deodorizing composition contained therein is assured.

Furthermore, wicking means **30** must also be positioned in holding zone **24** in an area which will be directly adjacent notch **25** or any other opening means incorporated with container **21**. As is apparent from this disclosure, in order to attain the desired air freshening-/deodorizing effect, with the composition absorbed within wicking means **30** being dispensed through the open zone, when formed, wicking means **30** must be positioned in cooperating association with the exit portal in order to assure that the desired dispensing of the air freshening/deodorizing composition to the surrounding ambient air is achieved.

In the preferred embodiment of the present invention, as discussed above, notch **25** is employed in order to open container **21** through the sealed zone thereof, to obtain access to holding zone **24** and wicking means **30**. In this way, a safe, easy, and convenient opening of container and dispensing system **20** is attained. By employing notch **25**, the user is capable of controlling the size of the opening being made, thereby enabling the user to form a portal through which the air freshening-/deodorizing composition can exit which is directly dependant upon the amount of air freshening or deodorizing desired.

By virtually removing the entire top half of container or housing **21**, maximum dispensing of the air freshener/deodorizing composition is attained. However, if the user desires a slower rate of dispensing, only a portion of the top part of container **21** would be opened, so as to prevent excessive dispersion of the air freshening/deodorizing composition from wicking means **30** through the portal formed by the user.

In FIG. **4**, an alternate controlled opening system is disclosed wherein a plurality of holes or portals **33**, **34**, **35** and **36** are formed in side wall **22** of container **21**. Since holes **33**, **34**, **35** and **36** are formed through side wall **22**, these holes provide dispensing portals for enabling the air freshening/deodorizing composition to exit from holding zone **24** to the ambient surrounding. In order to prevent unwanted, early dispersion of the air freshening/deodorizing composition, prior to the user's desire, an elongated sealing strip **38** is mounted in overlying sealing interengagement with portals **33**, **34**, **35** and **36**. In this way, holding zone **24** is completely sealed from the ambient surroundings and the desired, long-term retention of air freshening/deodorizing composition within holding zone **24** is provided.

Whenever the user is ready to employ air freshening-/deodorizing container and dispensing system **20**, scaling strip **38** is employed by pulling sealing strip **38** away from one or more of the portals otherwise maintained closed by sealing strip **38**. As depicted in FIG. **4**, sealing strip **38** is removed from portals **35** and **36**, while maintaining portals **33** and **34** completely sealed. In this way, an average rate of dispersion of the air freshening-/deodorizing composition is attained.

As is apparent from the foregoing disclosure, by removing sealing strip **38** from the desired number of portals, the precisely desired rate of dispersion of the air freshening/deodorizing composition is realized. If maximum distribution is desired, scaling strip **38** is completely removed. However, any other rate of dispersion can be easily attained by uncovering the desired number of portals otherwise sealed by strip **38**. In this way, the consumer maintains complete control over the rate of dispersion of the air freshening/deodorizing composition while also assuring that prior to use, the air freshening/deodorizing composition is securely retained in sealed interengagement within container **21**, with the composition being incapable of being dispersed or permeated through side walls or panels **22** or **23**.

In the preferred embodiment, the air freshening-/deodorizing composition employed in the dispersing system of the present invention comprises the uniquely constructed formulation designed specifically for providing a concentrated, potent, long-lasting air freshening and/or deodorizing effect. In accordance with the present invention, the air freshening/deodorizing composition comprises between about 90% and 99% of one or more oil-based fragrances and between about 1% and 10% by weight of a fixative for the oil-based fragrance.

In the preferred embodiment, the fixative employed in the composition of the present invention comprises methyl hydrogenated rosinate. Methyl hydrogenated rosinate is the ester of methyl alcohol and the hydrogenated mixed long chain acids derived from rosin. It has been found that this particular composition works most effectively as a fixative in providing a superior air freshening/deodorizing composition, with the preferred amount being 5% by weight.

In addition to the methyl hydrogenated rosinate, the composition of the present invention incorporates, in the preferred embodiment, a plurality of oil-based fragrances to provide the desired air freshening and/or deodorizing effect. Although a wide variety of oil-based fragrances can be employed in carrying out the present invention, without departing from the scope of the present invention, it has been found that the preferred

oil-based fragrances are selected from the group consisting of fruity notes, spices, cloves, eucalyptus, floral notes, jasmine, lavenders, wintergreen, spearmint, and wood notes. By employing one or a combination of these oil-based fragrances in the preferred quantity of 95% by weight of the entire composition, the desired air freshening and/or deodorizing fragrance is attained and the desired long-lasting, air freshening/deodorizing effect is realized.

In FIG. 3, the preferred embodiment of each of the side walls or panels 22 and 23 is depicted. Preferably, side walls or panels 22 and 23 comprise identical constructions, with both panels incorporating the identical integrally bonded multi-layered configuration. In FIG. 3, for exemplary purposes only, a portion of side wall panel 22 is shown in a greatly enlarged cross section in order to depict each of the plurality of integrally affixed layers forming side wall 22. As is apparent from the disclosure, panel 23 comprises an identical construction.

In the preferred embodiment, side wall or panel 22 and 23 comprises five separate and distinct independent layers, each of which are integrally bonded in secure, affixed interengagement to each other. The first or outer surface layer 41 comprises a polyester film, preferably having a thickness of about 48 gauge. Although other materials and thicknesses may be used for layer 41, polyester film is preferred in order to enable the surface of the layer to be printed upon.

The middle layer of side wall 22 is layer 43 which comprises a thin metal foil material. Preferably, metal foil layer 43 comprises a thickness ranging between 0.0001 and 0.0005 inches, with a thickness of 0.0003 inches being preferred.

In order to securely bond metal foil layer 43 to polyester film layer 41, layer 42 is employed. Preferably layer 42 comprises a low density polyethylene film having a thickness of about 0.00075 inches. Although other bonding films and other thicknesses may be employed, low density polyethylene is preferred and has proven to provide the desired intimate affixation of foil layer 43 to polyester layer 41.

The final two layers are layers 44 and 45. Layer 44 is similar in function to layer 42 and provides the desired secure bonding of foil layer 43 to layer 45. Although any suitable bonding film and thickness may be employed, layer 44 preferably comprises ethylene acrylic acid copolymer with a thickness of about 0.0015 inches.

Inside layer 45 of side wall 22 preferably comprises a film of linear low density polyethylene. Preferably, the thickness of layer 45 is about 0.00125 inches. The composition of layer 45 is particularly important, since the secure affixation of side wall 22 with side wall 23 is achieved by heat-sealing the outer peripheral edges of side walls 22 and 23 to each other.

In the preferred embodiment, side walls 22 and 23 are placed in overlying relationship with each other and, at the appropriate process time, the contacting surfaces of layer 45 of side walls 22 and 23 are intimately affixed together to form the desired, completely sealed container 20. By employing linear low density polyethylene film as layer 45, the desired complete sealed, bond affixation of side walls 22 and 23 is assured.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above constructions without departing from the scope of the present invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Particularly, it is to be understood that in said claims, ingredients or compounds recited in the singular are intended to include compatible mixtures of such ingredients wherever the sense permits.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A dispensing system for providing controlled, long-term release of an air freshening and/or a deodorizing fragrance, said system comprising
   - A. a container formed from two independent, multi-layered, flexible sheets and incorporating a sealed holding zone, each of said multi-layered, flexible sheets comprising
     - a. at least one barrier layer formed from metal foil for preventing the transfer of the air freshening-/deodorizing composition from the holding zone to the ambient surroundings when the container is sealed,
     - b. at least one low density, linear polyethylene film layer intimately bonded to one surface of the barrier layer for providing inherent strength and surface sealability between the two independent multi-layered, flexible sheets, and
     - c. at least one polyester layer integrally bonded to the opposed surface of the barrier metal foil layer for providing a print receiving surface;
   - B. a highly concentrated, long-lasting, air freshening-/deodorizing composition contained within the holding zone and comprising
     - a. between about 90% and 99% by weight of the entire composition of at least one oil-based fragrance, and
     - b. between about 1% and 10% by weight of the entire composition of a fixative;
   - C. highly absorbent wicking means comprising material formed from cotton and mounted in the holding zone of the container in direct, absorbing and wicking interengagement with the air freshener/-deodorizing composition; and
   - D. a composition dispensing portal
     - a. formed in the container in a normally sealed configuration to prevent the release of the air freshening/deodorizing composition from the holding zone until desired, and
     - b. controllably openable for providing a variable sized fragrance dispensing portal, whereby the air freshening/deodorizing fragrance is able to exit from the wicking means into the ambient surroundings.

2. The dispensing system defined in claim 1, wherein said wicking means is further defined as being positioned in the holding zone in cooperative association with the portal for assuring ready transfer of the air freshening/deodorizing composition to the portal for dispersement into the ambient surroundings.

3. The dispensing system defined in claim 2, wherein said wicking means is further defined as being constructed for providing continuous, long-term transfer of the air freshening/deodorizing composition to the ambient surroundings.

4. The dispensing system defined in claim 3, wherein said wicking means is further defined as being formed from cotton batt.

5. The dispensing system defined in claim 3, wherein said wicking means is further defined as being formed from woven cotton material.

6. The dispensing system defined in claim 3, wherein said wicking means is further defined as being sized for substantially filling the holding zone and retaining the air freshening/deodorizing composition fully absorbed therein.

7. The dispensing system defined in claim 1, wherein each of the independent multi-layered flexible sheets is further defined as comprising polyethylene bonding layers formed between the opposed surfaces of the metal foil layers and the layers affixed thereto for assuring secure affixation and bonded interengagement between said layers and said metal foil layer.

8. The dispensing system defined in claim 7, wherein said barrier layer formed from metal foil is further defined as being formed from aluminum and having a thickness ranging between about 0.0001 and 0.0005 inches.

9. The dispensing system defined in claim 1, wherein said fixative of the air freshening/deodorizing composition is further defined as comprising methyl hydrogenated rosinate.

10. The dispensing system defined in claim 9, wherein said at least one oil-based fragrance is further defined as comprising at least one selected from the group consisting of fruity notes, spices, cloves, eucalyptus, floral notes, jasmine, lavender, wintergreen, spearmint, and wood notes.

11. The dispensing system defined in claim 10, wherein said air freshening/deodorizing composition is further defined as comprising about 5% by weight of the fixative and about 95% by weight of the at least one oil-based fragrance.

12. The dispensing system defined in claim 1, wherein said portal is further defined as comprising a plurality of holes formed in one of said two independent multi-layered flexible sheets, with said holes being cooperatingly associated with an overlying sealing strip, removably mounted thereto for enabling the user to obtain access to one or more holes for providing the desired dispensing of the air freshening/deodorizing composition.

13. The dispensing system defined in claim 1, wherein said portal is further defined as comprising a partially formed slot formed in a sealed portion of the holding zone positioned for being extendable into the holding zone at any desired amount for achieving a portal of any desired size.

14. The dispensing system defined in claim 1, wherein the two independent multi-layered flexible sheets forming the container are further defined as each comprising five separate and independent layers bonded in intimate interengagement with each other for forming a completely flexible, moldable container for being positioned in any desired location.

15. A dispensing system for providing controlled, long-term release of an air freshening and/or a deodorizing flagrance, said system comprising

A. a container formed from two independent, multi-layered, flexible sheets and incorporating a sealed holding zone, each of said multi-layered, flexible sheets being further defined as comprising

a. at least one barrier layer formed from metal foil for preventing the transfer of the air freshening-/deodorizing composition from the holding zone to the ambient surroundings when the container is sealed,

b. at least one low density, linear polyethylene film layer intimately bonded to one surface of the barrier layer for providing inherent strength and surface sealability between the two independent multi-layered, flexible sheets, and

c. at least one polyester layer integrally bonded to the opposed surface of the barrier metal foil layer for providing a print receiving surface;

B. a highly concentrated, long-lasting, air freshening-/deodorizing composition contained within the holding zone and comprising

a. between about 90% and 99% by weight of the entire composition of at least one oil-based fragrance selected from the group consisting of fruity notes, spices, cloves, eucalyptus, floral notes, jasmine, lavender, wintergreen, spearmint, and wood notes, and

b. between about 1% and 10% by weight of the entire composition of a fixative comprising methyl hydrogenated rosinate;

C. highly absorbent wicking means

a. comprising material formed from cotton and mounted in the holding zone of the container in direct, absorbing and wicking interengagement with the air freshener/deodorizing composition;

b. positioned in the holding zone in cooperative association with a portal formed therein for assuring ready transfer of the air freshening-/deodorizing composition to the portal for dispersement into the ambient surroundings; and

c. constructed for providing continuous, long-term transfer of the air freshening/deodorizing composition to the ambient surroundings; and

D. a composition dispensing portal

a. formed in the container in a normally sealed configuration to prevent the release of the air freshening/deodorizing composition from the holding zone until desired, and

b. controllably openable for providing a variable sized fragrance dispensing portal, whereby the air freshening/deodorizing fragrance is able to exit from the wicking means into the ambient surroundings.

16. The dispensing system defined in claim 15, wherein said wicking means is further defined as being formed from cotton batt.

17. The dispensing system defined in claim 15, wherein said wicking means is further defined as being formed from woven cotton material.

18. The dispensing system defined in claim 15, wherein said air freshening/deodorizing composition is further defined as comprising about 5% by weight of the fixative and about 95% by weight of the at least one oil-based fragrance.

19. The dispensing system defined in claim 15, wherein said portal is further defined as comprising a plurality of holes formed in one of said two independent multi-layered flexible sheets, with said holes being cooperatingly associated with an overlying sealing strip, removably mounted thereto for enabling the user to obtain access to one or more holes for providing the desired dispensing of the air freshening/deodorizing composition.

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